Railway Engineering and Maintenance

RELIANCE hy-crome SPRING WASHERS *automatically* keep track bolt joints *tighter longer*

- Day and night, winter and summer, traffic or no traffic, the powerful helical coil spring action and special high-alloy spring steel of Reliance Hy-Crome Spring Washers keep track joint bolts under constant tension and *tighter longer*. They automatically compensate for looseness resulting from wear and temperature changes.
- It's like having a maintenance man at each joint ready to tighten each nut the instant looseness develops.
- Rail end batter and joint bar sag are reduced, maintenance requirements are cut, costs are minimized.
- Convince yourself; try the Reliance Hy-Crome Spring Washer suitable for your needs.
- Check the Reliance Hy-Crome Family of Spring Washers scientifically designed and produced to cope with all service and application requirements.

igemark of Quality

EATON

ATON MANUFACTURING COMPANY

EATON RELIANCE DIVISION, MASSILLON, OHIO

New York Cleveland Detroit Chicago St. Louis San Francisco Montreal

DRIVE IN THE WEDGE

LOCK IT (Double Protection!)

Essential principles of the Bethlehem 811. To a special tie plate is welded a sturdy bracing part (1). Fitting between this part and the rail is the tapered wedge, into which is swaged a steel spring (2). The spring will withstand tremendous compression force, thereby adding to the tightening effect. Two pawls turn down into slots (3) so that the wedge cannot move.

TWO EASY STEPS THAT MEAN A TIGHT RAIL BRACE

Ask any track man how easy it is to get a tight fit with Bethlehem's 811 Rail Brace. He'll tell you there's nothing to it at all. Just drive the wedge in place and lock it there with twin pawls. The wedge, being always under spring compression, can't loosen from shock. No amount of jarring and jolting can cause it to shift position.

Study the large illustration, which shows clearly why the 811, once installed, is permanently tight. When you want to remove it, however, it won't fight you. Isn't at all stubborn.

There are probably many 811's in track near you. Why not have a look? Or ask a Bethlehem man for full details.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

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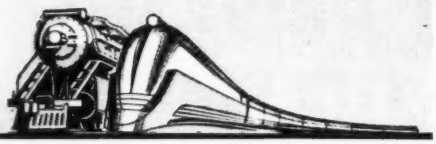
"Shop and Track Talk"



Published by OXWELD RAILROAD SERVICE DIVISION, Union Carbide and Carbon Corporation

Tons of Ballast Laid Low with Low Cost Tamping Bars

Even after months of steady pounding, ballast tamping bars made from inexpensive materials by oxy-acetylene pressure-welding, show little signs of wear. The rugged, long-wearing bars —given an economical flame-hardening treatment which helps them resist wear—are made at low cost by a western railroad.

Two parts make up the bar, a handle and a blade—this saves forging and machining costs. The first step is to upset a collar on the bar. This is done in the pressure-welding machine. Then

This pressure-welding machine was built by a railroad to make ballast tamping bars and other tools from inexpensive materials.

the two parts are pressure-welded. An OXWELD ring burner heats the joint, pressure is applied, and in about three minutes the weld is made.

About 125 of these high-quality bars are turned out each day. Several other track tools are made by the same method . . . and all the tools get a flame - hardened case which means longer life.

If you'd like to make these bars, or other track tools in your shop, write to OXWELD. We'll be glad to show you how easily you can use pressure-welding and flame-hardening to save money.

Finished ballast tamping bar. Upset collar and the weld between blade and handle were made in pressure-welding machine.

What's News?

▶ A railroad shop replaced broken tipple gears used on coal cars by flame-cutting new ones from steel plates — 606 inches of fast, accurate cutting saved demurrage on hundreds of cars.

▶ Excellent results have been obtained from the use of HELIARC welding on stainless steel under stress — welds are clean, smooth, and strong.

▶ An efficient UNIONMELT flexible welder is used on a production-line setup in one shop. Parts are arranged in a 21 ft. diam. circle around the machine. The welding operator merely goes from one part to another to make the required welds.

▶ Railroads are adding another money-saving operation to their track-laying program — flame-cleaning the ends of the rail. By removing mill scale from rail ends, the joints do not freeze — require much less maintenance.

OXWELD RAILROAD SERVICE DIVISION
Union Carbide and Carbon Corporation
Carbide and Carbon Building UCC Chicago and New York

Longer Life for Frogs and Crossings

Simple, oxy-acetylene flame-hardening setups lengthen the life of open-hearth frogs and crossings. Frogs treated by this process give far longer service than unhardened frogs – more than five times longer service. The cost of the operation is so small—a No. 10-100 lb. frog can be hardened for less than $7.00, including the cost of handling—that large reductions in railroad maintenance expense are possible.

Ask OXWELD for Booklet F-7007 which describes this economical hardening process.

Quick Henry, the Hooks

When a shop foreman needed a pair of diesel handling hooks in a hurry, he got them—in a hurry. The flame-cutting shop produced them quickly from 10 in. billets.

The terms "Heliarc," "Oxweld" and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation or its Units.

Faster on those everyday maintenance problems!

A Northwest Crawler Crane can be put on the job faster. It loads and unloads under its own power on a standard flatcar or trailer and it can be used either on the line or off the line, or it will operate from the car itself.

It is convertible from a standard Shovel to a Crane or Dragline by simply changing booms, giving you the choice of the most efficient machine for the problem.

Such features as the Northwest Dual Independent Crowd, that utilizes force other shovels waste; the Cushion Clutch Northwest Uniform Pressure Swing Clutches; Northwest simplicity of design, that makes upkeep easy; and the safety of the "Feather-Touch" Clutch Control, that assures the absolute impossibility of shutdown due to control failure; combine for faster handling of your maintenance-of-way problems from widening right-of-way to trimming banks.

Let us tell you more about it. Northwest does things no track type machine can do.

NORTHWEST ENGINEERING COMPANY
1513 Field Bldg., 135 S. LaSalle St., Chicago 3, Ill.

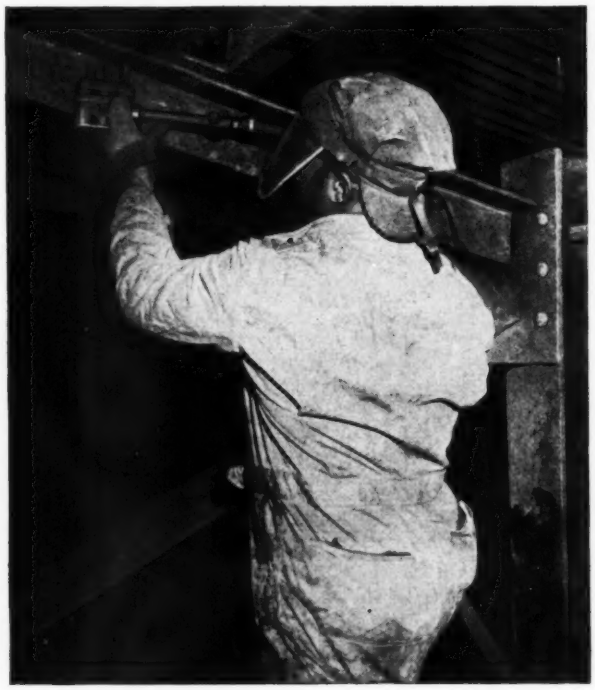
NORTHWEST

THE ALL PURPOSE RAILROAD MACHINE
SHOVEL • CRANE • DRAGLINE • PULLSHOVEL

Proved on the Nation's Leading Railways

Cost-Cutting Tools FOR BRIDGE BUILDING

Tough scaling jobs are handled quickly with the air-powered CP Triple Scaler — weighing only 7¼ pounds. No chisels are required, as the pistons act as chisels, hammering old paint, rust or scale without damaging the underlying surface.



Designed for drilling holes in masonry, concrete and stone up to 1¼ inches in diameter, the 7½-pound, air-powered CP-9 self-rotating Handril does the same work as non-rotating hammer drills of triple its weight. Readily operated with one hand, even for up-drilling. A specially designed chuck makes it easy to change steel. The same chuck handles non-rotating chisels.

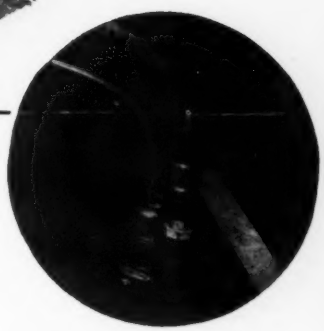
Loose scale is rapidly removed from any metal surface with air-powered CP Wire Brush Machines. Models, with either straight or pistol grip handles, are available with a wide choice of radial and cup wire brushes.

AND MAINTENANCE-OF-WAY

The CP-220 Hicycle Electric Concrete Vibrator can be operated anywhere in a 400-foot radius, without stopping to move the portable gasoline generator. Built for one-man operation. The vibrator motor is in the head of the tool; there is no flexible shafting.

Designed for concretes of 2" slump and over; walls, footings, columns, floor and roof slabs; precast piles and similar products. Capacity of 30 to 40 cubic yards an hour.

The powerful CP-365 Air Impact Wrench, with controllable rotary impact action, is unexcelled for fast, safe nut-running, and the application or removal of bolts, studs or lag screws. Absence of twisting or kickback, and little vibration, minimizes operator fatigue. Eight-inch extension shanks are available for screw spike driving.



The CP-20 Sump Pump operating at 40 pounds pressure against a 15-foot head, has a capacity of 200 gallons per minute. Operating at 80 pounds pressure against a 50-foot head, its capacity is 225 gallons per minute.

A single-stage centrifugal pump that requires no priming, it starts pumping instantly when air is turned on and the unit lowered into water.

Perfectly balanced, requiring no riding, easy to hold, the CP-117 and CP-118 Cut Spike Drivers will drive any cut spike in a few seconds.

CHICAGO PNEUMATIC TOOL COMPANY

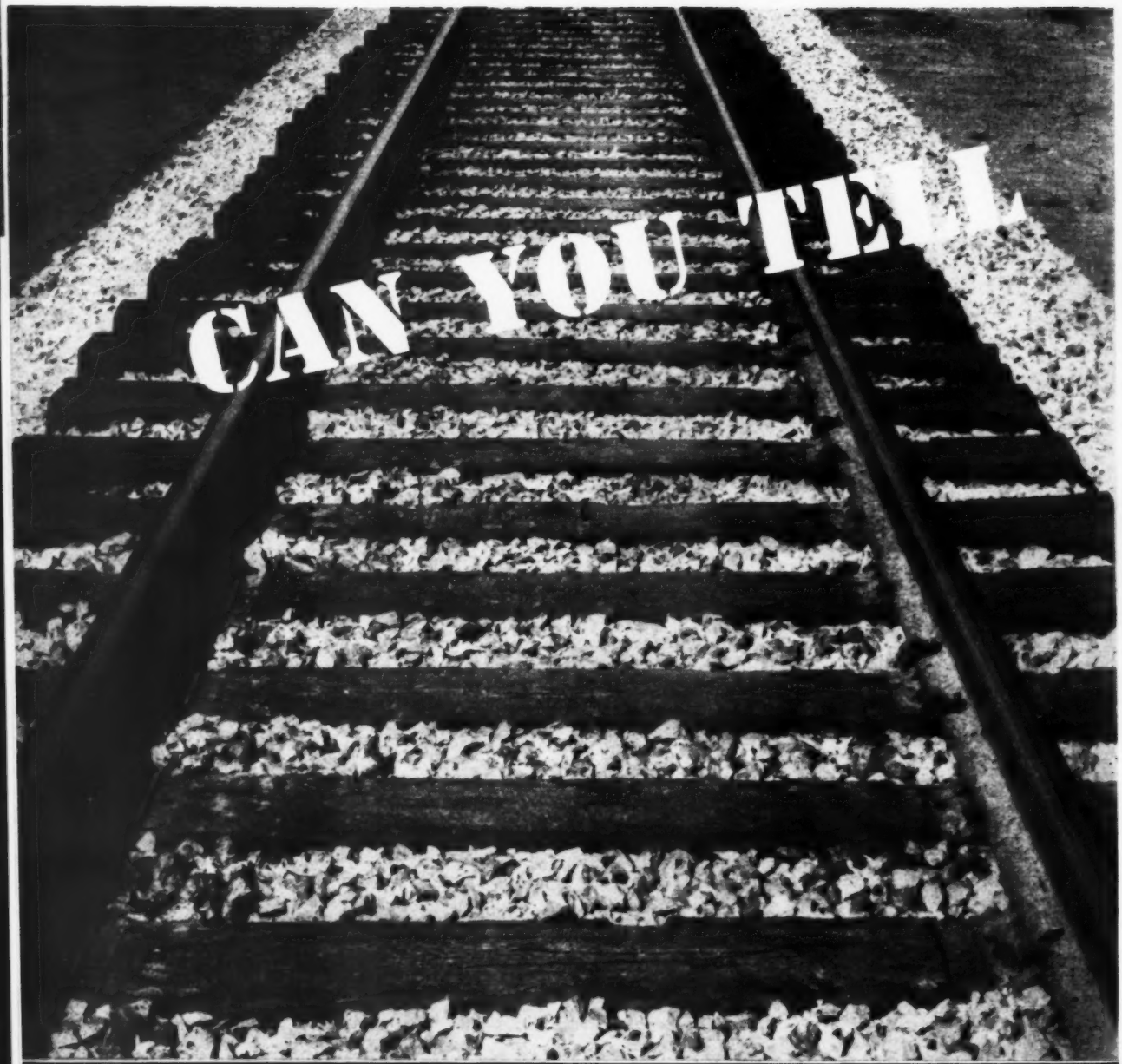
General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

The same ties

Just installed . . .

and after 7 years service



TAYLOR-COLQUITT CO.

SPARTANBURG, SOUTH CAROLINA

VAPOR-DRIED* ties resist checking and splitting. Here is proof . . . pictures of a test track taken nearly 7 years apart.

See if you can tell which is the older picture. (Neither is retouched) Then turn the magazine upside down and check your answer at the bottom of the page. Right or wrong, it was probably a guess, for these Vapor-Dried* ties today reveal few signs of age.

Write today to learn of many advantages of Vapor-Drying*.

TAYLOR-COLQUITT CO. T·C TIMBER CONSERVATION

*Process patented

Answer

e picture at the right, taken in April, 1944, ows the ties after six months in track. The ter photograph was taken in October, 1950

Build with Corrugated Transite...

This diesel engine house shows how Corrugated Transite is used in combination with brick and glass to provide a virtually maintenance-free exterior . . . at low cost.

Not even corrosive fumes and smoke can affect the long life of Corrugated Transite roofing and siding.

. . . for low-cost, low-maintenance diesel shops

LOOK TO CORRUGATED TRANSITE*—an "Old-Timer" on many leading railroads—if you want diesel shops that defy fire, weather and corrosive fumes, yet cost less to build.

This time-tested Johns-Manville product is made of asbestos fibres and cement molded under pressure into tough, durable monolithic sheets. It is rotproof, rustproof, and fireproof . . . never requires paint or other preservative treatment . . . is virtually maintenance-free. And, important in structures housing diesel equipment, it will not absorb oil-laden exhaust fumes which might create a fire hazard.

Sheets of Corrugated Transite speed construction, too, for they come from 3 to 11 ft. long, 42" wide . . . thereby cover large areas quickly. They are easy to cut or drill, require only a minimum of framework, can be readily fastened to steel or wood.

Corrugated Transite is equally adaptable for roofing or siding—on either new or remodeled structures. It can be used alone, or in combination with other materials such as brick, glass or stone.

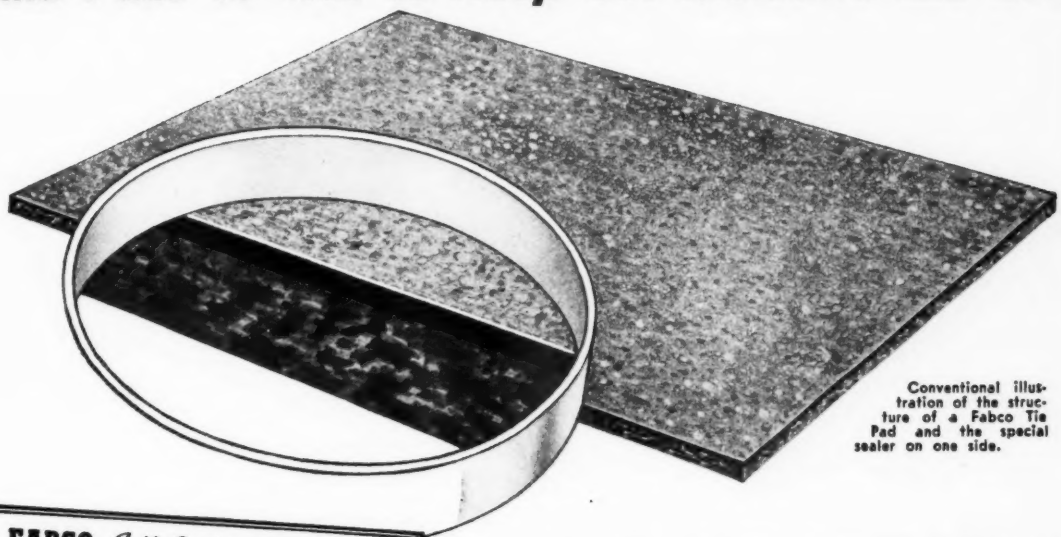
Why not look into the many possibilities for savings by using Corrugated Transite in the construction of housing for your diesel equipment? Further information is available in brochure TR-45A . . . yours for the asking. Just write to Johns-Manville, Box 290, New York 16, New York. In Canada: 199 Bay Street, Toronto 1, Ontario.

*Reg. U. S. Pat. Off.

JM PRODUCTS **Johns-Manville** 92 YEARS OF SERVICE TO TRANSPORTATION

FABCO *Self-Sealing* TIE PADS

Bind Pads to Ties to Keep Out Moisture and Dirt



Conventional illustration of the structure of a Fabco Tie Pad and the special sealer on one side.

FABCO *Self-Sealing* TIE PADS effectively seal out moisture and dirt between the pad and the tie.

Coated only on the side next to the tie. Freedom of movement of the tie plate is permitted with less disturbance to the tie bond.

Special coating is firmly adhered chemically to the pad without decreasing the strength or resilience of the pad.

Sealing agent is specially compounded to withstand extremes of temperature in both summer and winter.

Self sealing pads require no more labor for installation than regular Fabco Tie Pads.

OVER THE YEARS Fabco Tie Pads of resilient rubber and cotton fibre have demonstrated their ability to prevent mechanical wear of ties through elimination of plate cutting, and give long life service as well.

MAINTENANCE OF WAY departments suggested that if Fabco Tie Pads could be bonded to the tie so as to prevent intrusion of moisture or dirt between tie and pad, their effectiveness might be further increased under certain conditions. After exhaustive tests we announce a tie pad sealer that we are confident is superior to anything yet offered . . . Applied to Fabco Tie Pads before shipment it consists of a 1/16" coat of sealing compound on the side of the pad next to the tie. Since tie plates tend to move under traffic, it is advisable not to bond the pad to the plate, but leave the plate free to move, — greatly reducing any tendency to break the seal between the bottom of the pad and the tie . . . Same standard and special sizes as unsealed Fabco Tie Pads, but 5/16" thick instead of ¼".

For Maximum Protection Against Mechanical Wear of Ties
Use Fabco Tie Pads
Sealed or Unsealed According to Conditions

FABREEKA PRODUCTS COMPANY
INCORPORATED
222M Summer Street, Boston 10, Massachusetts

NEW YORK 17, 122 E. 42nd Street — CHICAGO 10, 325 W. Huron Street — DETROIT 2, 6432 Cass Avenue — SPARTANBURG, S. C., P. O. Box 1168
PHILADELPHIA 2, 16 South Broad Street — PITTSBURG 22, 336 4th Avenue — OAKLAND 11, CALIF., 3871 Piedmont Avenue

It's New...

It's Different

and results

PROVE

It's Better!

ESTERON BRUSH KILLER

Dow research and Dow manufacturing know-how have gone all-out to make Esteron Brush Killer the best product in its field. This improved formulation has been extensively used by leading railroads and service organizations. It has been PROVED the *best* product you can buy for effective brush control.

- It now contains the NEW, PATENTED LOW-VOLATILITY esters of 2,4-D and 2,4,5-T.
- It also contains a higher percentage of active ingredients—4 pounds acid equivalent per gallon.
- It has demonstrated that it will kill a greater variety of woody vegetation and weeds and will give better roadway maintenance at lower cost.

Yes, Esteron Brush Killer packs a wallop! Included in your right-of-way maintenance program, it will give good control of alder, ash, birch, brambles, cherry, elm, hickory, maple, oaks, osage orange, poison ivy, sumac, willow and other hard-to-kill species. When it is applied in oil immediately after cutting, it will control resprouting of stumps.

Dow will be glad to furnish you with a wealth of information on clearance and maintenance of right-of-ways with chemicals. Dow sales and technical men are available for consultation and assistance on your vegetation control problems from grass and weeds in ballast to brush on the right-of-way. Your inquiries are invited. Ask for Folder IN-168.

Also recommended for woody plant control is Esteron 245. For controlling grasses such as Johnson, quack and Bermuda—use Dow Sodium TCA 90%. No fire hazard—and treated foliage presents no poison hazard to grazing cattle.

AGRICULTURAL CHEMICAL DIVISION

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

DOW

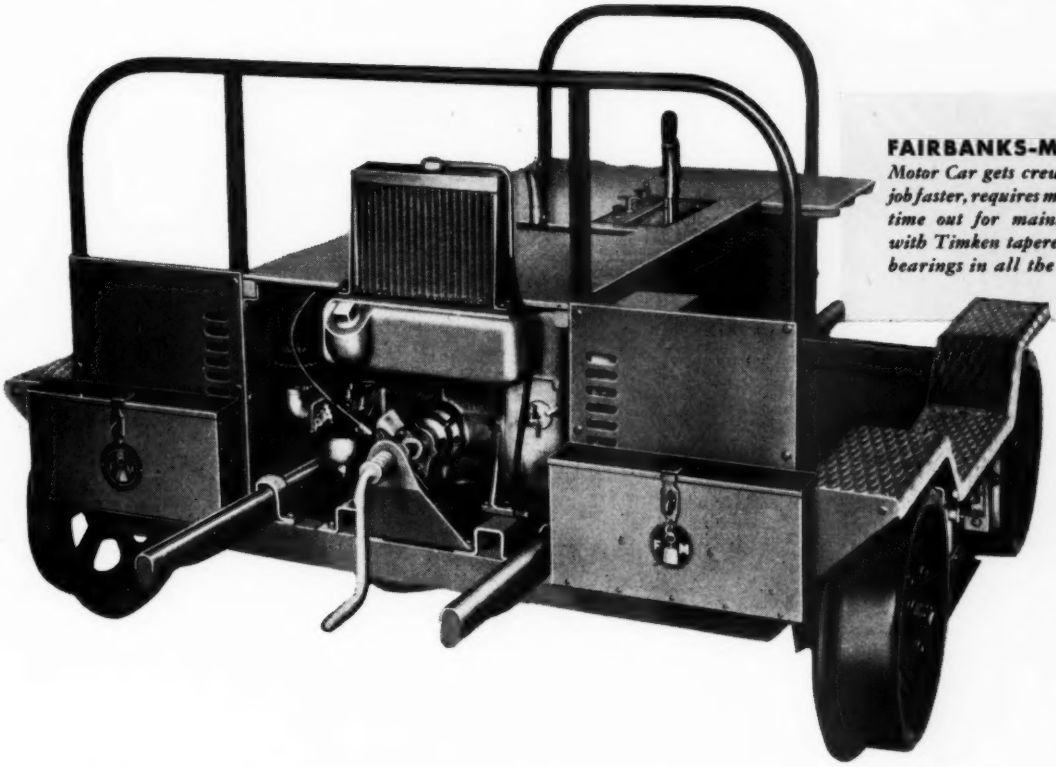
CHEMICALS

INDISPENSABLE TO INDUSTRY AND AGRICULTURE

USE DEPENDABLE DOW AGRICULTURAL CHEMICAL PRODUCTS

WEED AND GRASS KILLERS • INSECTICIDES • FUNGICIDES
SEED PROTECTANT • PLANT GROWTH REGULATORS
GRAIN AND SOIL FUMIGANTS • WOOD PRESERVATIVE

Car that goes looking for trouble stays out of it—with TIMKEN® bearings



FAIRBANKS-MORSE
Motor Car gets crews to the job faster, requires minimum time out for maintenance, with Timken tapered roller bearings in all the wheels.

KEEPING the trouble-shooting Fairbanks-Morse 101 Inspection Car out of trouble is the job for Timken® bearings. They're mounted in the four wheels of this new, lightweight inspection car built for fast, efficient service anywhere along the line. With the Model 101 rolling on Timken bearings, maintenance is minimized, breakdowns are prevented and friction is virtually eliminated.

Timken bearings are precision made and finished to incredbile smoothness. Made of Timken fine alloy steel, the best ever developed for tapered roller bearings, they normally last the life of the car. Line contact between the rollers and races gives Timken bearings extra load-carrying capacity. The advanced design of Timken bearings permits the use of tighter closures that keep dirt and moisture out—keep the lubricant in. And lubrication time is reduced to a minimum.

Due to their tapered construction, Timken bearings take both radial and thrust loads in any combination. Wheels are kept in positive alignment, and wheel gauge is accurately maintained.

No other bearings can give you *all* the advantages you get with Timken tapered roller bearings. Be sure they are included in all the equipment you build or buy. And always look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

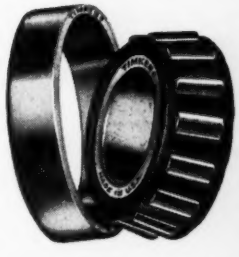
This symbol on a product means its bearings are the best.

WE MAKE OUR OWN STEEL

The special grade alloy steel which gives Timken bearings their strength and resistance to wear, is made in our own steel mills.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

TIMKEN
TRADE-MARK REG. U.S. PAT. OFF.
TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◎ AND THRUST ←◎→ LOADS OR ANY COMBINATION ✳

Flame Cleaning

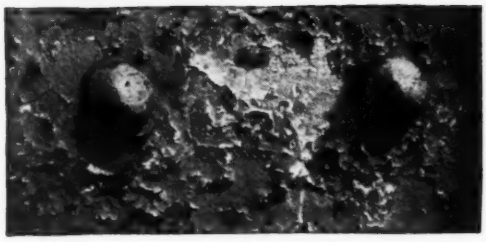
prepares bridge members for painting

Leading railroads find that flame cleaning quickly prepares bridges, trestles and other metal surfaces for painting—*with savings up to one half the cost of hand scraping and chipping.* Further, in addition to actual dollar savings, they found that the flame cleaned surface produced a better finished paint job.

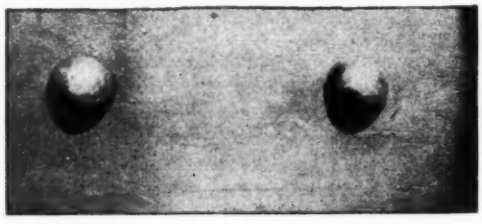
Quickly, easily and safely applied, the Airco flame cleaning process provides a clean, warm and dry surface conducive to a lasting paint job. The oxyacetylene flame cockles old paint, loosens scale and drives off hidden moisture . . . gives longer paint life to all kinds of steel structures.

New steel structures, too, should be flame cleaned before application of the prime coat of protection. This method loosens semi-tenacious mill scale and leaves no corrosion-starting dirt or hidden moisture. Future maintenance costs are reduced to an absolute minimum.

For further details write for folder ADG-1066B — "Flame Cleaning and Dehydrating Old Steel Structures", and folder ADG-1067A—"Flame Cleaning and Dehydrating New Steel Structures". Write your nearest Airco office.



BEFORE — *Close-up view shows conditions of paint-lift heavy rust and scale that were met.*

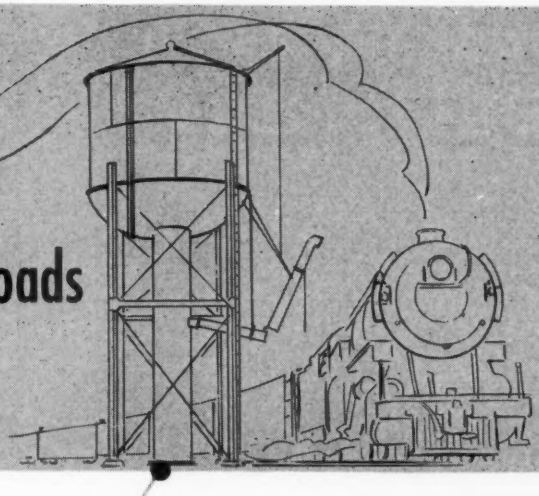


AFTER — *The finished job after flame cleaning. A smooth, clean, dry surface ready for a lasting coat of paint.*

AIRCO **AIR REDUCTION**

Offices in All Principal Cities

Headquarters for Oxygen, Acetylene and Other Gases . . . Carbide . . . Gas Welding and Cutting Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories



SINCE 1905

America's Leading Railroads

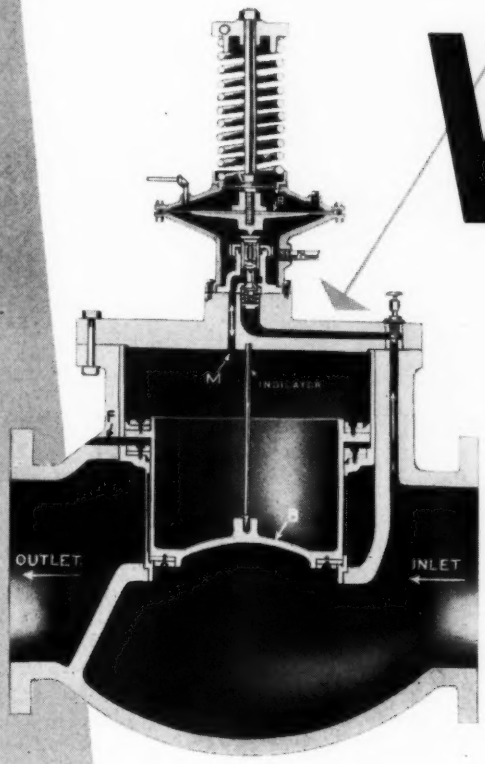
specify

GA

cushioned

ALTITUDE

VALVES



Golden-Anderson Cushioned Altitude Valves have proven efficiency and performance records on elevated tanks of the main railroads of America. These valves maintain a uniform water level and can additionally be arranged to automatically function pumps, electrical devices or signal lights. The air and water cushioning in all Golden-Anderson valves prevents any shock or hammer and permits valve to operate smoothly at all times. *Write for technical data.*

GOLDEN-ANDERSON *Valve* **SPECIALTY CO.**

2078 Keenan Building **Pittsburgh 22, Pa.**

LIFE AND PROPERTY PROTECTION

VALVES SINCE 1905

BEALL
Spring Washers

Made Especially For Railroad Service

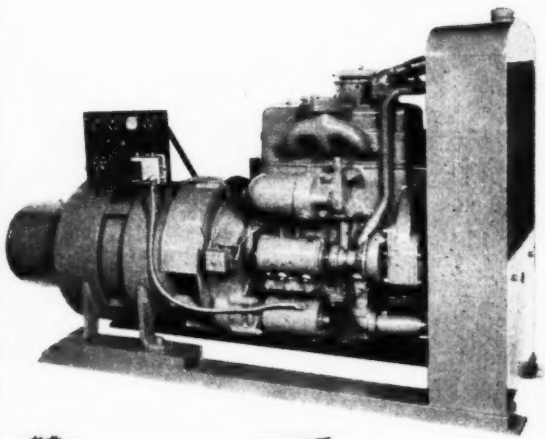
BEALL Hi-Duty SPRING WASHERS are made especially to stand the strain of the heavy-duty rail service required by today's high speed freight and passenger trains.

These washers are strong and tough, yet provide the necessary "springing action" required at rail joints, frogs and crossings.

We control every step of their manufacture —from the specification of the specially-developed formula and process used in making the steel to the forming, hardening, tempering and testing operations.

BEALL TOOL DIVISION
of Hubbard & Co. • EAST ALTON, ILL.
Specialist Manufacturers of Spring Washers

Just one repair in 10 years of use!



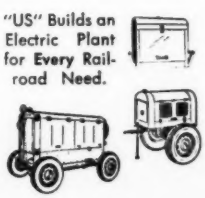
This kind of dependability cuts costs for railroads too!

A "US" 15-KW Diesel-driven Electric Plant has operated approximately 6500 hours in this garage in Hadley, Mass., without once having the head off. The *only* repair has been the replacing of a bolt in the coupling! Just one more proof that "US" simple design and rugged construction pay off! There's a "US" unit for every railroad use. Write for information.

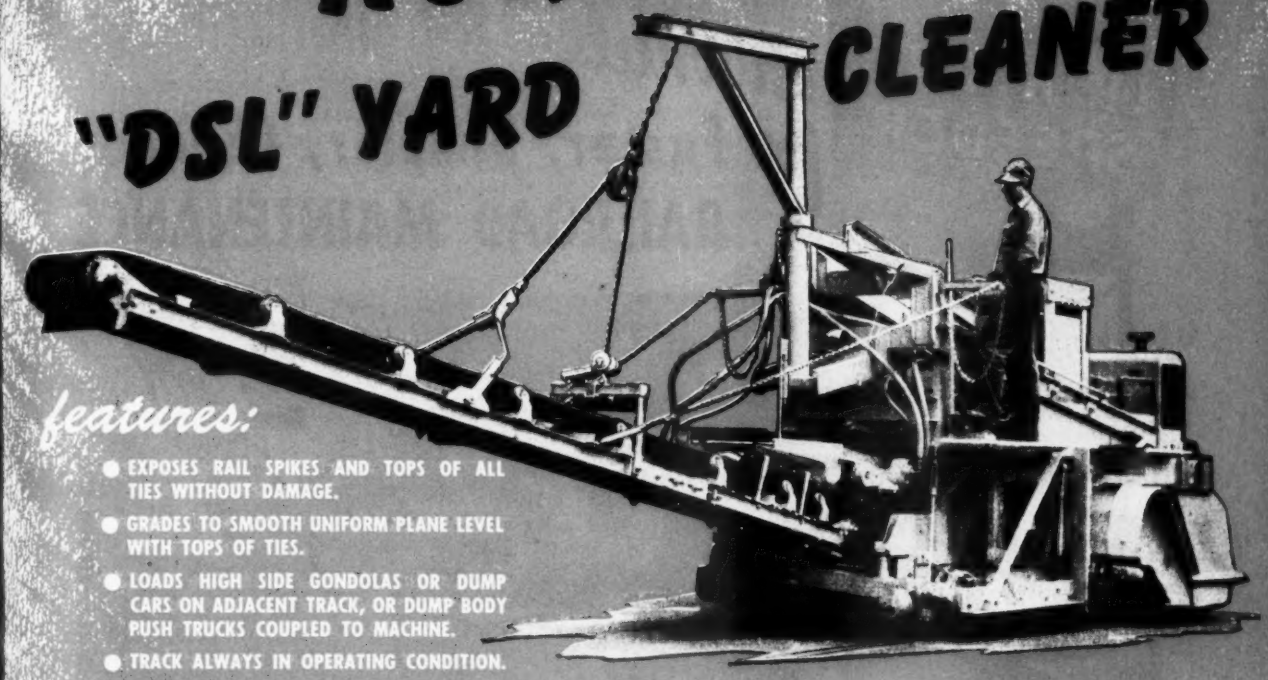
UNITED STATES MOTORS CORPORATION
US
OSHKOSH, WISCONSIN

UNITED STATES MOTORS CORP.
438 Nebraska Street
Oshkosh, Wisconsin

"US" Builds an Electric Plant for Every Railroad Need.



NORDBERG "DSL" YARD CLEANER



features:

- EXPOSES RAIL SPIKES AND TOPS OF ALL TIES WITHOUT DAMAGE.
- GRADES TO SMOOTH UNIFORM PLANE LEVEL WITH TOPS OF TIES.
- LOADS HIGH SIDE GONDOLAS OR DUMP CARS ON ADJACENT TRACK, OR DUMP BODY PUSH TRUCKS COUPLED TO MACHINE.
- TRACK ALWAYS IN OPERATING CONDITION.
- MATERIAL REMOVED IS HANDLED ONLY ONCE.

. . . Another time and money savin maintenance machin

Clean more track—faster, better, and more econor ically than ever before—with the Nordberg DS Yard Cleaner. And do it without damaging the tie

Here's how it works . . .

As a self-propelled machine, the Nordberg DS Yard Cleaner moves on the rails with two plov grading the intertrack and feeding the material in an impeller. The impeller, which is composed rotating banks of short steel cable, lifts this materi as well as that on the ties and deposits it on tw cross conveyors. The material is then fed onto 20-ft. wasting conveyor for disposal. This convey can be raised or lowered and swung in an a of 180°.

Having completed a cleaning job, the Nordbe DSL Yard Cleaner is easily removed from the tra by a hydraulically actuated run-off device.

Write for full details of this latest Nordberg Tra Maintenance Machine.

B7

Look to NORDBERG

. . . for continually improved TRACK MAINTENANCE MACHIN to do a Better, Faster Maintenance Job at Lower Cost

LINK-BELT SPEEDER *on wheels*

for **Faster, Simpler, Cheaper RAILROAD MAINTENANCE**

With off-the-track Link-Belt Speeder equipment you can meet exacting maintenance and construction schedules — without interrupting traffic. Besides being faster in moving off the right-of-way, wheel-mounted Link-Belt Speeders move faster from job to job — at reduced transportation costs — and are more mobile on the job. They're more maneuverable, too: they move easily and safely in close quarters. And talk about dependable! — a Link-Belt Speeder stays at work, trouble-free, even when the going is roughest.

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An HC-70 Truck-Crane proves faster, simpler and cheaper at replacing ballast during track-resurfacing operation on the Boston & Maine.

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Builders of the Most Complete Line of SHOVELS-CRANES-DRAGLINES

11,628

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On Any of the Products Mentioned in This Issue

Below is a complete index of the products referred to in both the editorial and advertising pages of this issue. If you desire additional information on any of them, use one of the accompanying addressed and stamped postcards in requesting it. In each case give name of product and page number. The information will come to you directly from the manufacturer involved, without any obligation on your part.

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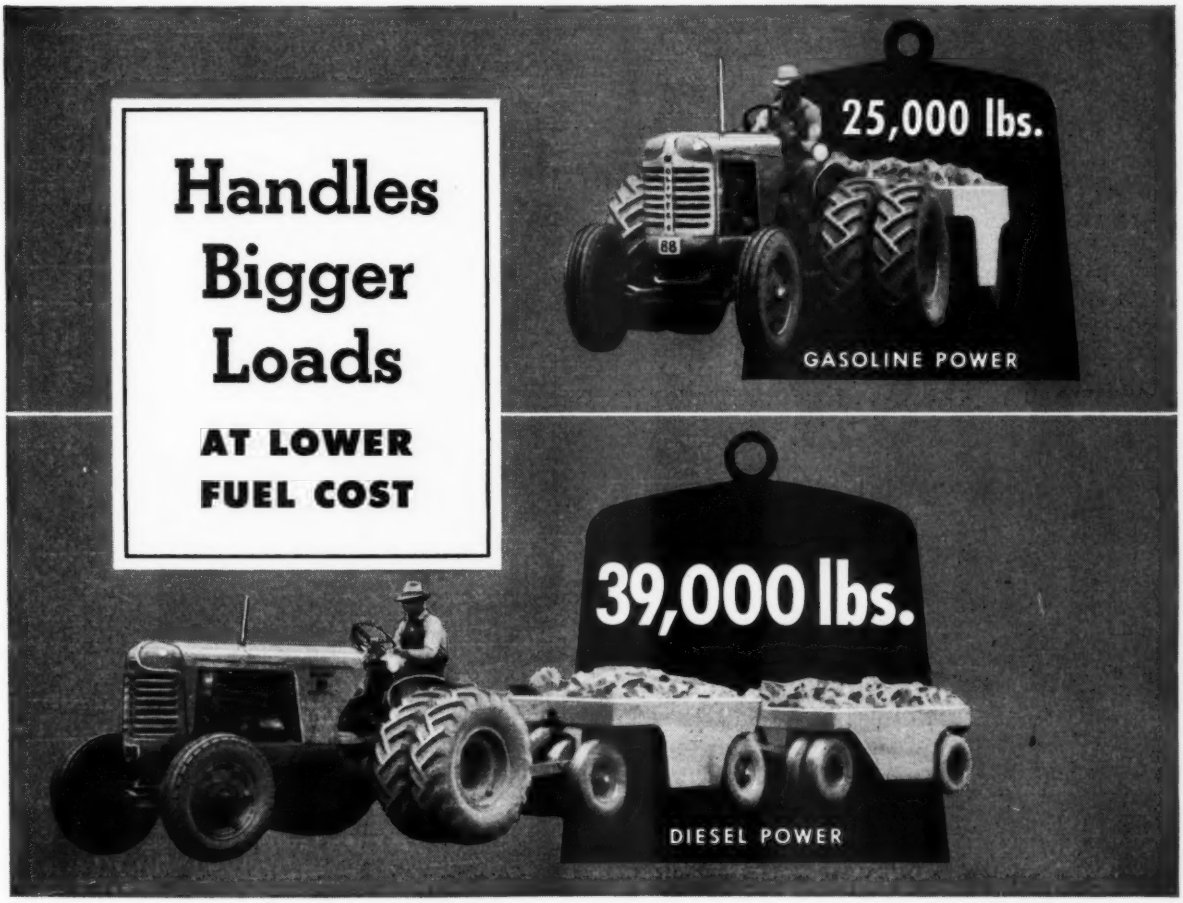
OLIVER DIESEL POWER



What better proof could you ask of the *economy* you get with the new Oliver "88" Diesel Wheel Tractor? On this job an "88" Diesel is handling *two* rubber-tired compaction rollers vs. a gasoline powered tractor of equivalent size pulling *one* roller. The owner reports a fuel cost saving of 50% even though the Diesel model was pulling a load of 39,000 lbs. vs. the Gasoline model pulling a load of 25,000 lbs.

The new Oliver "88" is a natural for industrial wheel tractor operations. It's remarkably easy to start . . . requires no starting preparations. Overall efficiency is high due to superior air and fuel mixture. Efficient burning of fuel and air assures exceptional fuel savings. Prolonged piston head pressure increases lugging ability under heavy loads.

You'll find it will pay dividends in increased load handling ability . . . lower operating costs to investigate the new Oliver "88" Diesel Industrial Wheel Tractor. Your Oliver Industrial Distributor will give you the complete story.

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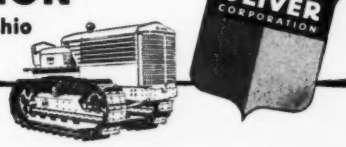
Industrial Division: 19300 Euclid Avenue, Cleveland 17, Ohio

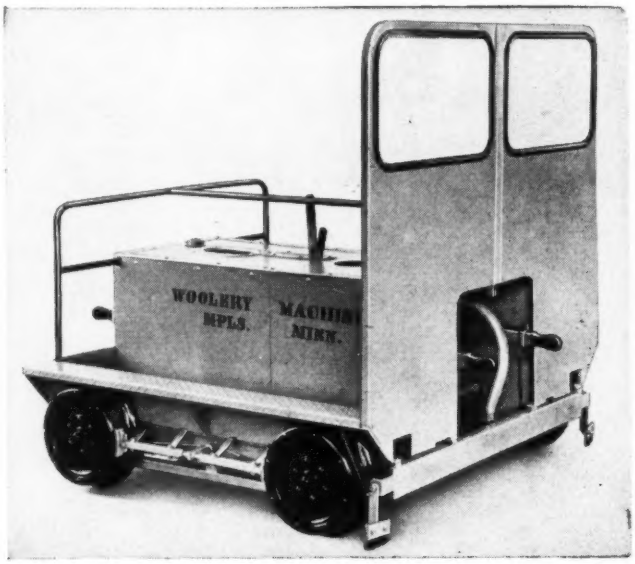
A complete line of Industrial Wheel and Crawler Tractors



4-Wheel Drive gets you through when other motor cars can't

YOU can't **stop** the snow, rain, or sleet that will make heavy going this winter, but the WOOLERY No. 300 Motor Car will **help** to get you over the line, whatever the weather.

THE WOOLERY No. 300 Motor Car has 4-Wheel Drive **plus** differential when needed. This 4-wheel-drive traction enables it to out-perform all other makes of motor cars, in all kinds of weather and track conditions, especially in heavy snow. All the weight of the car and its load is on the driving wheels, front and rear, contributing to increased traction and utilizing the full power of the engine when needed. The 13-h.p. engine is air-cooled; will not freeze in winter nor overheat in summer; gives more power per pound of weight. Multiple V-belt drive from engine to transmission delivers full power under all weather conditions.



The WOOLERY No. 300 Motor Car has a draw-bar pull of 405 pounds. Light enough for one man to lift on or off at crossings, yet large enough to carry eight men and track tools.

FLANGEWAY CLEANER IS QUICKLY ATTACHED

WITH the WOOLERY Flangeway Cleaner mounted on the WOOLERY No. 300 Motor Car, one operator can clear miles of track. Two circular cutters, lowered into the flange-way to a predetermined depth, revolve at 1800 r.p.m. and steel guards and chutes mounted on the cutters deflect loosened ice and snow from the flangeways.

WOOLERY Flangeway Cleaner attaches to No. 300 Motor Car with only 6 bolts. V-belt and roller chain drive assure full power under all conditions.

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Pioneer Manufacturers of RAILWAY MAINTENANCE EQUIPMENT
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The JACKSON MULTIPLE TAMPER becomes a PHENOMENALLY FAST-EFFICIENT SPOT-TAMPER and SMOOTHING MACHINE!

U-651-A BLADE

Now the same **Jackson Multiple Tamper,** which is used for new ballast insertion and out-of-face surfacing operations, can be quickly converted to the most phenomenally efficient, economical machine for spot tamping or smoothing in those operations where there is little or no raise and no additional ballast is spread. All that is necessary is to change to the narrow blades shown here with their newly developed spot-tamping tips.

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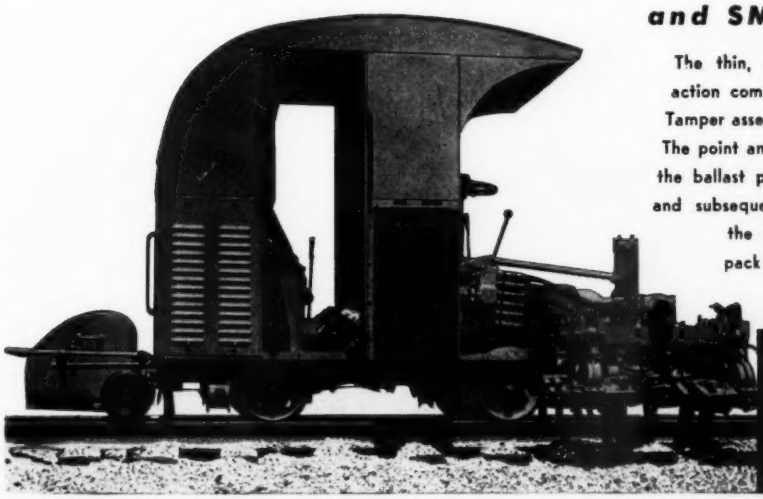
THE KEY TO FASTER, LESS COSTLY — SPOT TAMPING and SMOOTHING OPERATIONS

The thin, narrow spot-tamping tip with its vibratory action combined with the weight of the entire Multiple Tamper assembly, quickly and easily penetrates the ballast. The point and step of the tip pushes and wedges together the ballast particles under the tie, eliminating the voids, and subsequent insertions introduce fine fragments from the ballast section to completely fill and tightly pack the entire bed.

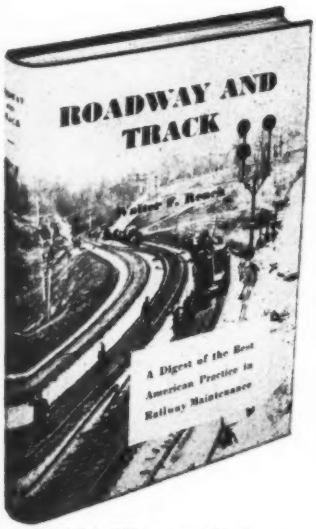


ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON • MICHIGAN

A Handbook of
Modern Track Work

ROADWAY AND TRACK

By Walter F. Rench
Formerly Supervisor on the Pennsylvania Railroad;
Author of Simplified Curve and Switch Work



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The third edition features the use of the latest mechanical equipment in connection with roadway and track maintenance. Older methods employed where full mechanical equipment is not available are also explained. While most of the methods described are those which are standard on the **Pennsylvania,** A.R.E.A. recommended practices and those in use on other well maintained roads have also been included.

Outstanding types of mechanical equipment used in track work are described and illustrated with action photographs. Engineering drawings show working details. The economies resulting from the adoption of modern methods are clearly outlined. Useful tables have been added to make the book suitable for reference use, as well as a practical handbook on modern methods.

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Part II—TRACK: Essential Elements in Maintenance of Track—Program for Maintenance of Way and Structures Work—The Track Obstruction—Power Machines and Equipment—Labor Saving Methods in Track Work—Track Materials and Their Uses—Practice in Rail Renewals—Practice in Rail Repair and Inspection—Maintenance of Main Tracks—Maintenance of Yards and Terminals.

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Send for a copy today and see how it will help you improve your knowledge of your work.

TRACK SUPERVISORS

While written primarily to serve the needs of track supervisors and other maintenance officers, it contains material of considerable interest to transportation and mechanical officers who require a working knowledge of the fundamentals of maintenance of way practice. Section and extra-gang foremen, who wish to acquire a broader knowledge of their work will find it particularly helpful.

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...with Monotubes

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Monotube Foundation Piles

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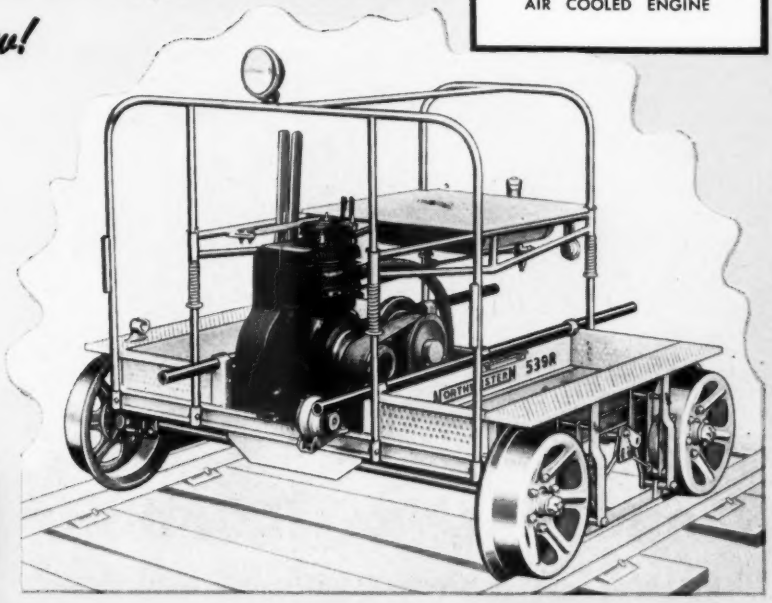

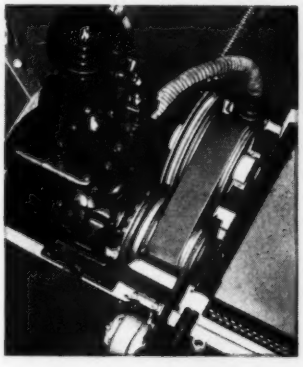

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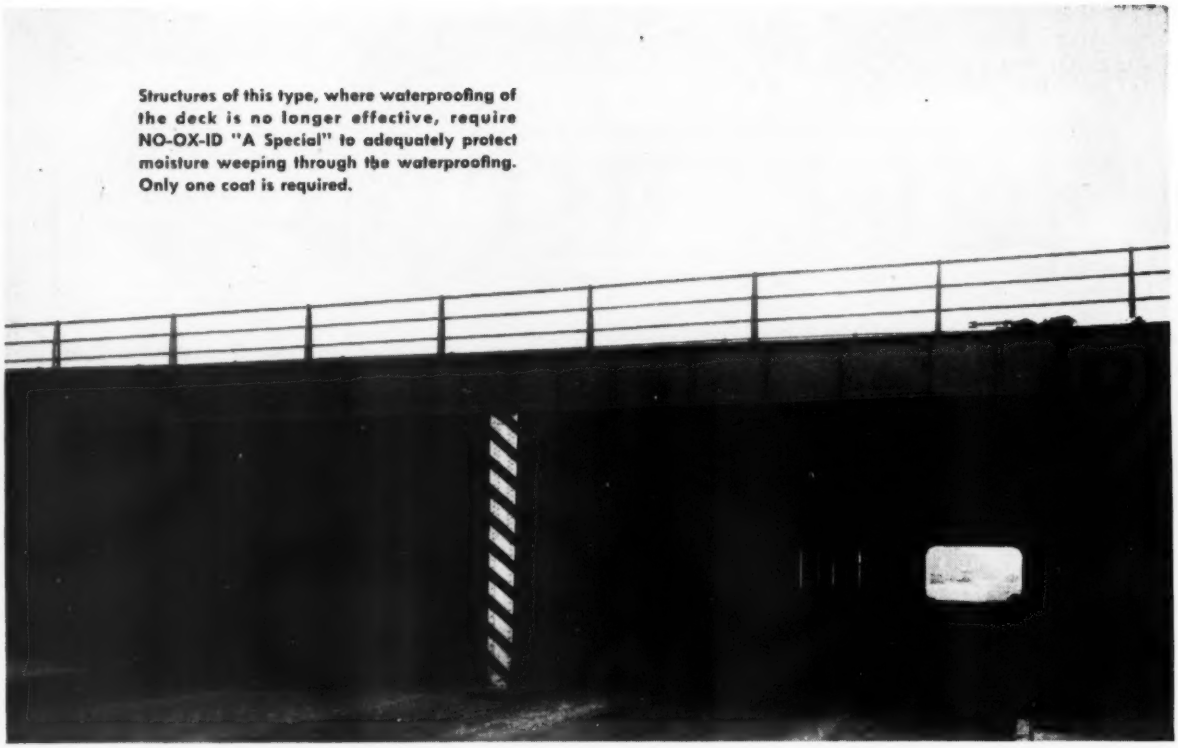

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NO BLIND SPOTS IN THIS CAB!

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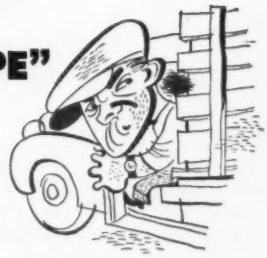
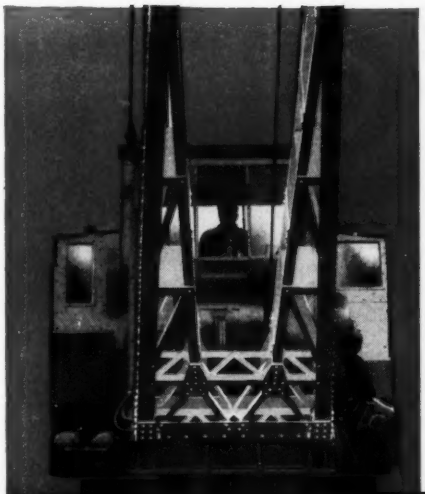
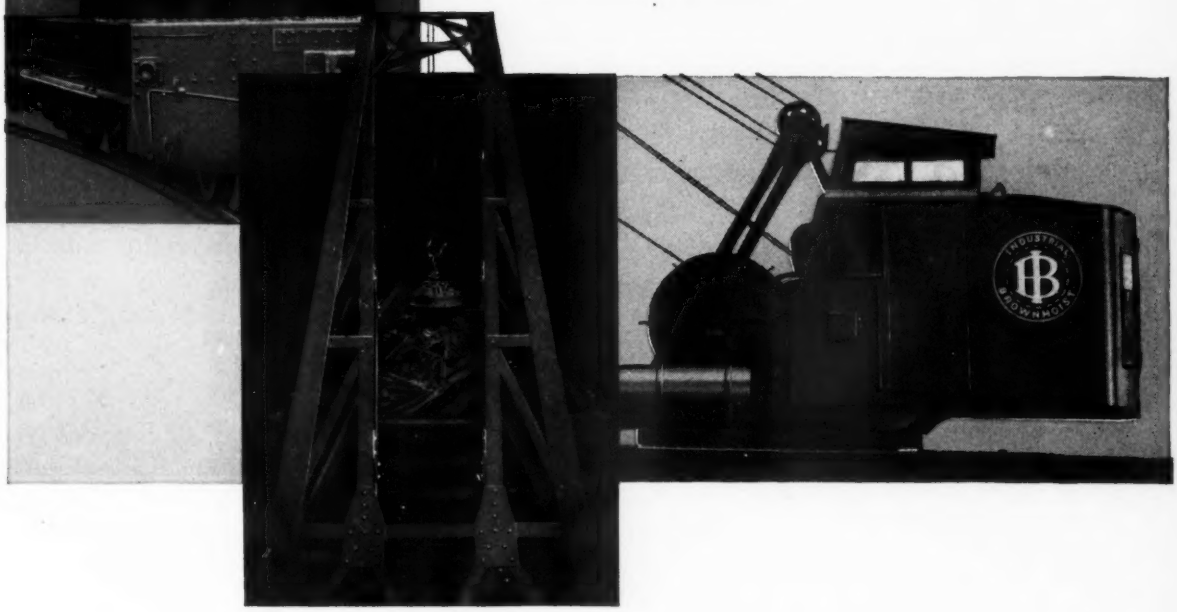




The patented Monitor-type cab, available only on Industrial Brownhoist Locomotive Cranes, is the one and only crane cab that provides a clear view from every angle — it's the one cab that allows full 360° visibility at all times — to the *front, sides* and *rear.* That's because the Monitor-type cab is fully enclosed with large windows and is placed *high on top of the crane.* The operator is *above* all machinery or braces that might obstruct his vision. He can speedily, accurately, and efficiently load or unload from high-walled railroad cars because he can look *right into* the car. Hoist and boom drums are in full view. To further insure good visibility, all Brownhoist cranes are equipped with the clear-vision boom that permits the operator to look right through it with unobstructed visibility.



In addition to full-circle visibility, the Monitor-type cab is designed to afford the utmost in comfort and safety including doors on both sides and 14" safety clearance between car and rotating upperworks. There is a soundproof partition between the operator and machinery — provision for opening all windows and doors for full ventilation — all operating controls are easily reached from a comfortable, well raised seat. Write today for more facts complete with specifications.

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1951

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Mark this as one of the *longest* forward strides ever taken in the field of mechanized track maintenance. Here is a new, improved power ballast cleaner, built to handle the *toughest* jobs with an ease and certainty hitherto unknown.

This 1951 Pullman-Standard model picks up both the shoulder and the crib ballast (where the track has been cribbed in advance), from *either or both sides of the track at once*—then screens and cleans the ballast and returns it to the track, distributed as desired, *without fouling adjacent track.*

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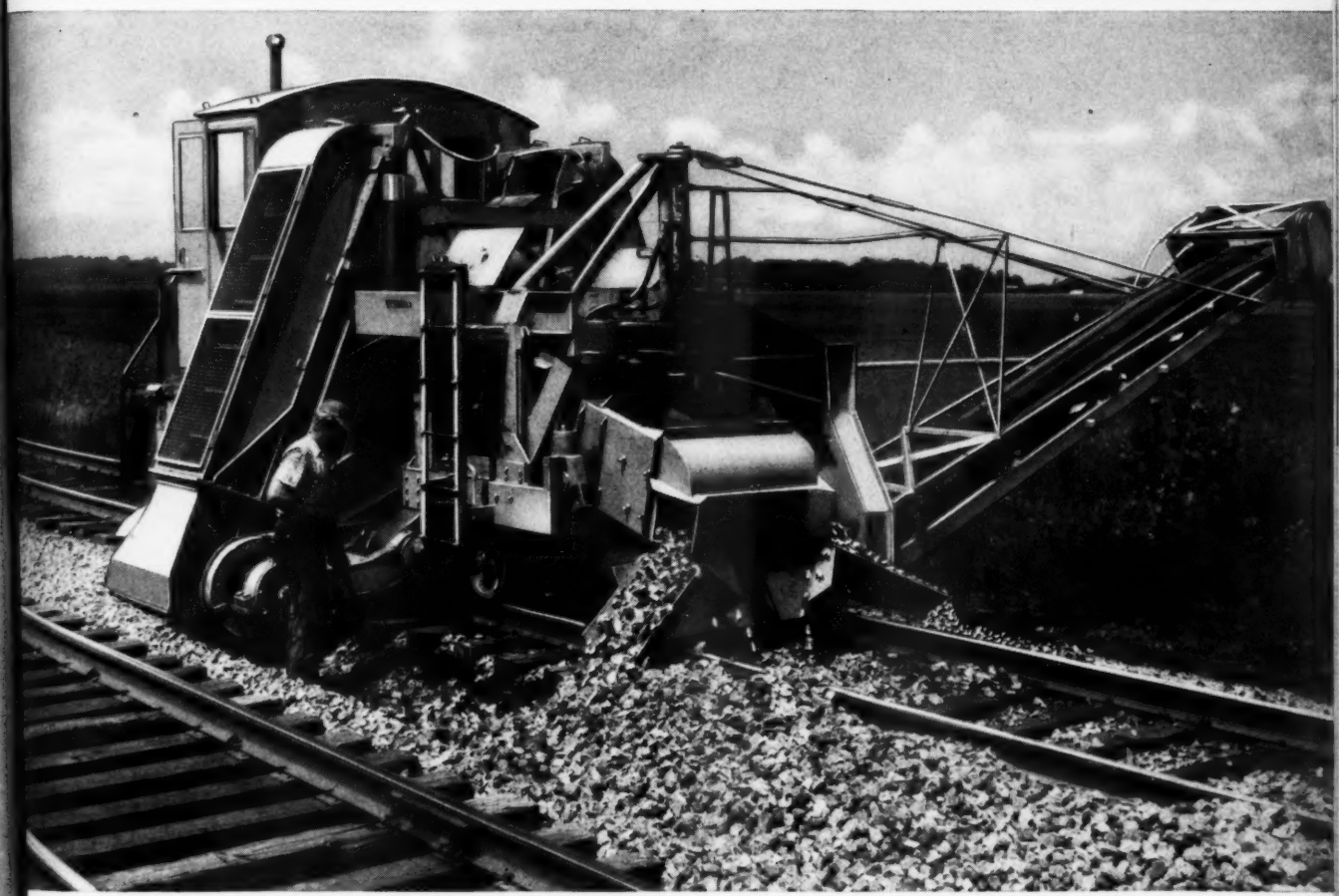
The new Pullman-Standard Power Ballast Cleaner is now in service on several railroads and is available for inspection under actual operating conditions. Also, a motion picture showing the machine at work will be loaned for exhibition to interested railroads.

**In normal hard-cemented fouled ballast and under normal rail conditions.*

MODEL



This Action View of the new Pullman-Standard Power Ballast Cleaner shows cleaned ballast being returned to track and shoulders, while the conveyor (adjustable over a range of 180 degrees) deposits dirt where convenient or useful. The cleaner is self-propelled, moving to and from location at speeds up to 25 m.p.h. Power-operated lateral set-off mechanism is built in.

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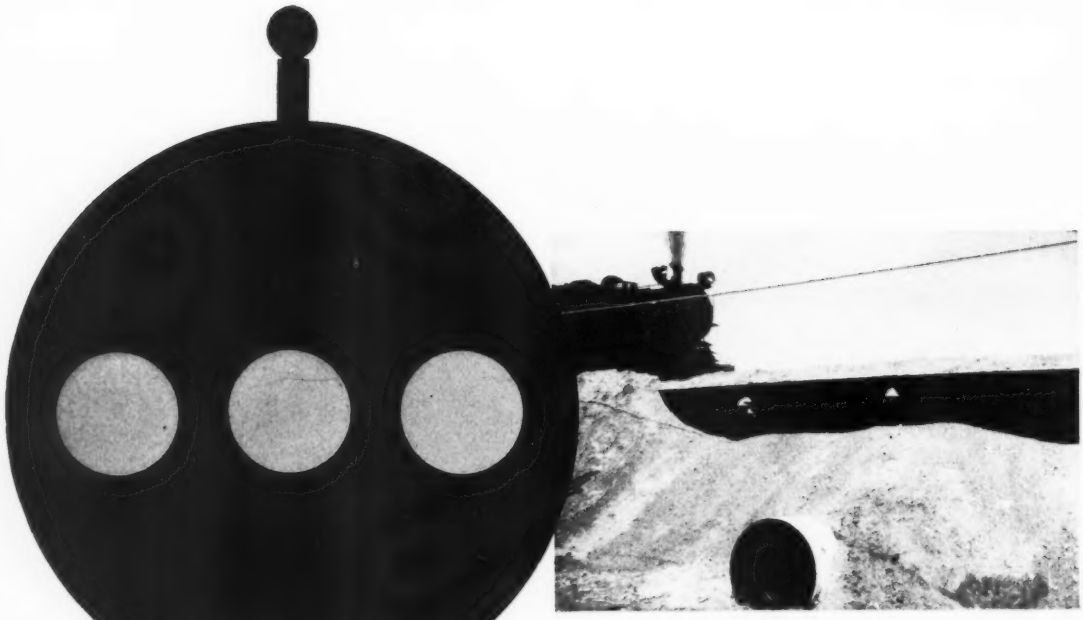
Triple-Action Cutting Mechanism cuts through the hardest cemented ballast, and triple-deck screening cleans the ballast thoroughly, with minimum loss of small aggregate.

Clean as a Whistle is this track after the Pullman-Standard Power Ballast Cleaner has done its work.



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ARMCO DRAINAGE STRUCTURES

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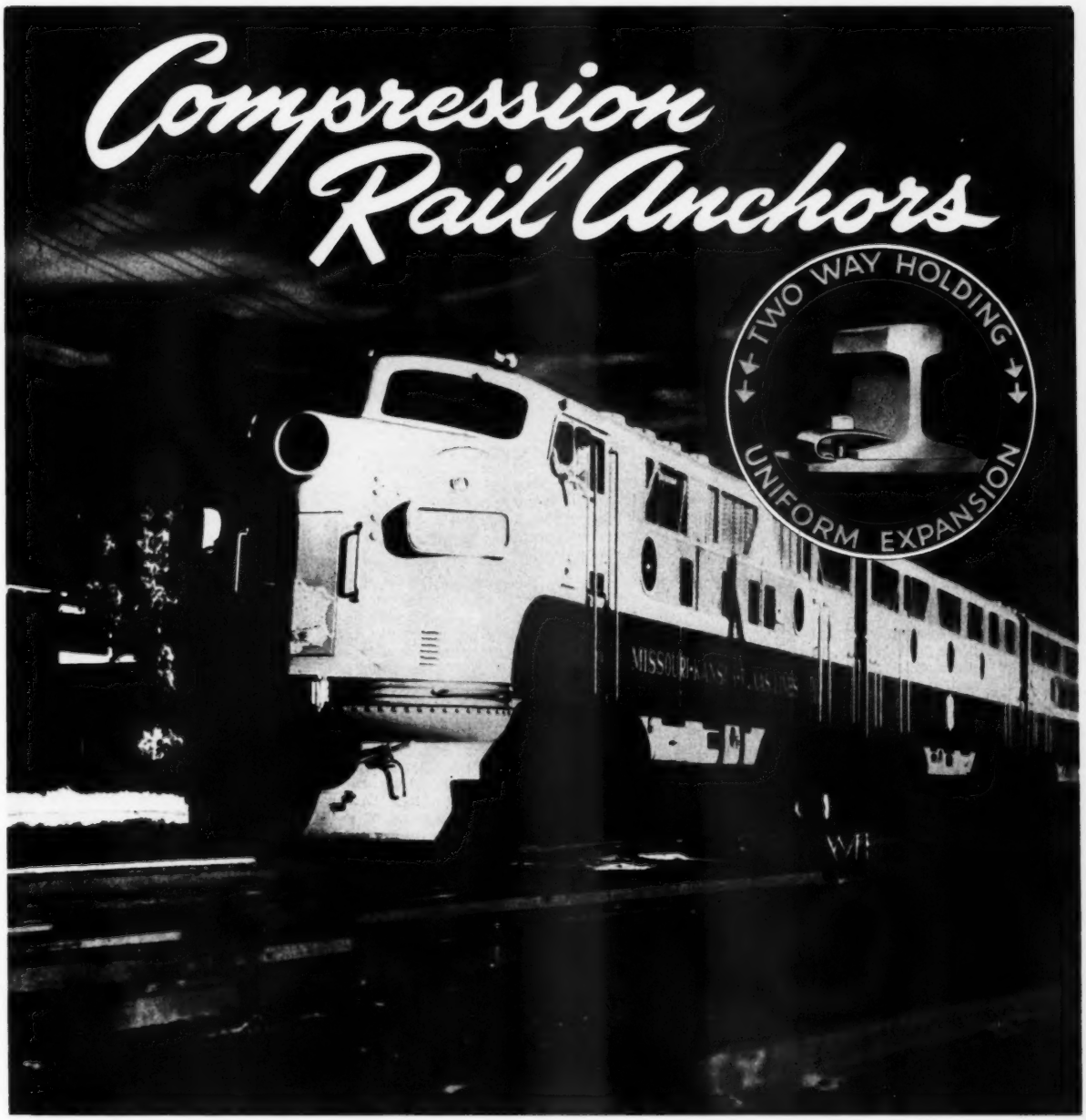

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No. 264 of a series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

79 W. MONROE STREET
CHICAGO 3, ILL.

Subject: Balancing Text and Pictures

December 1, 1950

Dear Readers:

A question that arises, and receives careful attention, each time an article is being prepared for publication in this magazine is this; What should be the relative proportions of the text and illustrations comprising it? You might suppose that reaching an answer to this question would be a simple matter. But after I explain some of the considerations involved you will understand why we feel it necessary to give much careful thought to the problem and why a great deal of head-scratching is frequently involved.

By its acceptance of the so-called picture magazines, such as Life and Look, a considerable segment of the reading public—a segment that is no doubt well represented among our readers—has indicated in no uncertain terms that it favors articles with plenty of pictures and a minimum of text. On the other hand, another, but perhaps somewhat smaller, segment, by its consistent readership of such magazines as Time and Newsweek, has shown that, when seeking information that does not lend itself to pictorial treatment, it is perfectly willing to wade through columns of text without pictures.

It seems to us that, in these two different reactions, the public is saying that it prefers well-illustrated reading material but that it does not necessarily demand photographs where they are not needed to supplement the text. You might say that this sentence contains the basic reasoning behind the policy of this magazine. Thus, we regard photographs and drawings primarily as a means of conveying information, but at the same time we recognize the value of illustrations as a means of helping to obtain an attractive appearance.

Both text and illustrations have their limitations as media for imparting information. In many instances a good photograph will take the place of hundreds of words, but at the same time there are some categories of information that cannot be imparted without text. The object must be, therefore, to integrate the use of both illustrations and words in such a manner that the story is told in the most acceptable and attractive form from the reader's standpoint.

The article entitled "Aluminum Deck for the Huey Long Bridge," which begins on page 1121 of this issue, is a good example of the use of words and pictures in a balanced relationship to tell a story that could not have been told adequately by either medium if used alone. Almost at the opposite extreme is the article, "Personnel Relations as an Aid to Greater Efficiency," by L. W. Horning of the New York Central. Mr. Horning's remarks comprise, in themselves, an integrated story that does not need to be extensively supplemented by illustrations.

The point I wish to make here is that what we try to achieve in laying out the feature articles for our magazine is a series of individual capsules of information, attractive in appearance, each consisting of words and illustrations proportioned in accordance with the particular needs of the subject matter involved.

Yours sincerely,

Merwin H. Dick

MHD:ag

Editor

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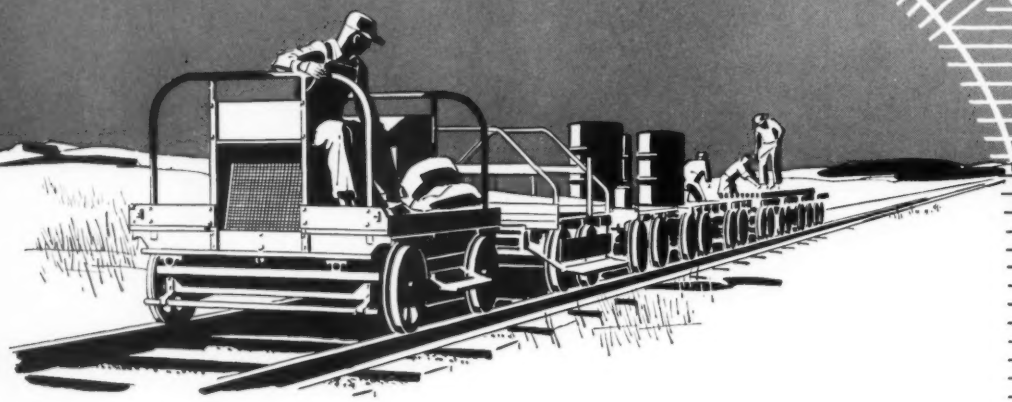

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VOL. 46, NO. 12 DECEMBER, 1950

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Fig. 3911
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Fig. 3911 (illustrated) for use with all types of column throw stands.
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Advance Planning —

Needed to Cope With Coming Shortages

Railway maintenance men as a whole never seem to have an easy row to hoe, that is, for any length of time. At any given period during the last two decades they have been confronted with one of two situations: (1) Inadequate appropriations because of poor earnings; or (2) shortages of manpower or materials which put a ceiling on maintenance activities at times when earnings were such as to justify larger expenditures for this purpose.

Both of these situations have applied in some degree at different times during the present year. In the early part of the period railroad earnings were trending downward and maintenance expenditures on many railroads were being cut to fit the cloth. But mounting tension throughout the world following the outbreak of war in Korea, and the resulting war-mobilization program, now still in its early stages, are bringing about a slow reversal of the situation. While earnings have been increasing there has been a gradual tightening up of materials and manpower with the prospect that the situation in both respects will become much worse, perhaps even critical, during 1951.

With the brotherhoods clamoring for higher wages, and with other items of operating expense still going up, there is little justification for a belief that completely satisfactory earnings are in the offing, even if carloadings continue to go higher. But there is little doubt that, to a large extent at least, the controlling factor in determining how much maintenance work is done in 1951 will be the available supplies of materials and labor, and not earnings. If this is a correct appraisal of the prospects for next year it is not too early for the railroads to take stock of the outlook for labor and materials and to outline some sort of strategy for dealing with both situations. An editorial on the following page discusses the labor problems that are likely to develop, and points out possible ways of dealing with them. Below is presented a similar discussion of the outlook for materials.

There are two principal facets to the materials problem. One is to obtain sufficient materials, such as rails and ties, to meet the enlarged needs of the properties that are likely to develop under a heavier burden of traffic. The other is to acquire work equipment in the amounts needed to assure the application of these materials in the face of a severe labor shortage. In both instances the railroads must be prepared to make a strong case for themselves, with both their suppliers and any government agencies to which the allocation of raw materials and production capacity may be assigned.

We need only to hark back to the vital role played by the railroads in serving the transportation requirements of the country during World War II to make the point that it would be suicidal to permit any deterioration of railroad properties at this time because of any lack of materials for repair purposes. Yet it would be dangerous if responsible railroad officers were to assume that the needs of the railroads will get full consideration without any action on their part. They must be prepared to go to the mat in Washington, and before the public if necessary, and fight for the materials necessary to meet their needs.

This fight must start with those officers who are directly responsible for the condition of the fixed properties. Only they are in a position to have a full and adequate picture of the needs of these properties, and if they do not take the initiative in making these requirements known, and in seeing that they are fully satisfied, no one else will.

MANPOWER—

Will Be in Short Supply in 1951

INDICATIONS are that a serious shortage of labor will confront the railroads next year. For one thing the available supply of manpower is expected to be reduced by an estimated one million men by inductions into the armed services. For another, it is estimated that the anticipated boom in the production of military and essential civilian goods in 1951 will require another 3 million persons. Hence, with 4 million additional men needed for next year, and with the number of unemployed now down to 2.3 million, of which 1 million can be expected to remain jobless, one may well wonder how the anticipated deficiency of 2.7 million men is going to be filled.

The manpower problems that beset the maintenance-of-way departments of the railroads during World War II are still too vivid in mind to have been forgotten. But in view of the prospects of an early reappearance of these shortages it would seem appropriate to review some of the expedients that were adopted to overcome them. Effective July 1, 1944, the newly-established War Manpower Commission put into effect the Priority Referral Plan which was designed to channel labor into essential industries, including the railways. As part of the plan, the Railroad Retirement Board was given responsibility for the recruitment of all railroad labor.

In addition most railroads made strenuous efforts of their own to maintain their maintenance-of-way and other forces at the required levels. Appropriate advertising was placed in local newspapers, posters were used in station buildings, and agents and other employees made personal efforts to interest men and women in railroad work. Close contact was established with local employment agencies, and, in some instances, special labor recruiting officers were employed.

Almost 50,000 Mexican nationals were brought into the country to work on the railroads, of which 46,600 were engaged in track maintenance activities. Approximately 10,000 high school boys were employed in such work during their summer vacations and on week-ends. Although more consideration had to be extended to these boys in the matters of housing, food, working conditions and recreation, a large amount of essential work was accomplished by them. In addition more than 2,500 women were employed in maintenance-of-way and structures work, other than clerical and as crossing watchmen.

Other expedients included the lowering and raising of the age limitations, the lengthening of the working hours, the improvement of labor housing and boarding conditions, the absorption by the railroads of at least part of the food costs at camps, the recalling of many retired railroad employees, and the use of automobiles or trucks to transport men from towns off of the line.

Just as manpower was one of the "problem children" of the earlier war period it threatens again to demand more and more of the time of maintenance officers in the coming year. But a review and reapplication of the lessons learned during that emergency, supplemented by any additional expedients that may be developed, will go a long way toward assuring that sufficient manpower will be found.

IN PREBORING TIES—

Why Must There Be So Many Holes?

AFTER extensive experience with prebored ties there seems to be little unanimity of opinion as to the full benefits derived from this practice, the manner of doing it, or the limit of use of the ties prebored.

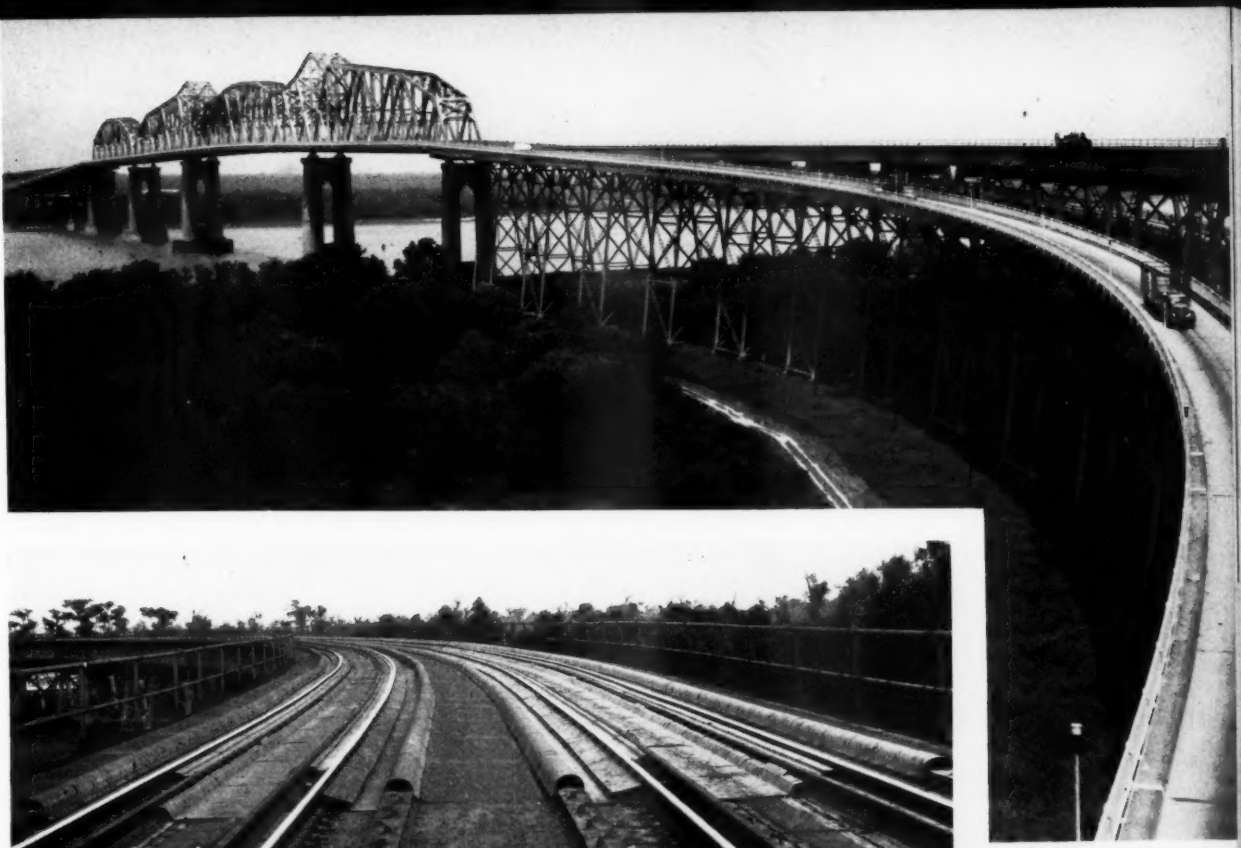
Few question the efficacy of preboring ties, as now practiced, for some uses, but some do not agree that all ties should be prebored. Others are less concerned with the question as to which ties should be prebored or which, if any, should not, than they are with the pattern of the holes to be bored.

This latter group is faced with several questions. Should the holes be bored only for all rail-holding spikes? Should they be bored only for two rail-holding spikes under each rail and for an anchor spike in each tie plate? Or should they be bored for all contingencies—to conform to the complete punching in standard tie plates? It is against this last mentioned practice that some of the greatest doubts are raised.

Every track man has doubtless seen ties prebored in this manner installed in tangent track of such character that only two rail-holding spikes and no anchor spikes are required in each tie plate. In such instances there are several holes in the tie that are not occupied with spikes. These holes become filled with water which has a tendency to splash out due to the vibration caused by passing trains. The presence of this water results in a softening of the wood in the tie plate area, causing the plate-cutting process to be accelerated. On some tracks subjected to brine drippings these prebored "wells" contain fluid that can be, and some say is, corrosive to tie plates and often to the rail.

Will such ties last longer because they were prebored, or will preboring have contributed to their early renewal? If this condition is as serious as some would have us think, what is the answer? Should the pattern of boring ties be selective, conforming to the standard of spiking for different classes of track? Some think that would be unwieldy and hence impracticable. Should the preboring pattern be in accordance with minimum spiking standards—and field boring carried out to cover those instances in which more spikes are desirable? Or should preboring be to a pattern that will meet all contingencies—and unused holes filled with tie plugs?

It is doubtful if these questions can be answered categorically, but surely further study of the problems they represent is not only justified but desirable. On the results of such study will undoubtedly depend the wisdom of spending so much money for preboring holes in some 25,000,000 ties each year.



Above — Photograph of the Huey Long bridge taken from the west approach

Left — In this view is shown, in the background, a sizeable section of the new aluminum decking in place, and, in the foreground, the old galvanized steel sheet as it appeared before the deck rehabilitation

Aluminum Deck For the Huey Long Bridge

As far back as 1943 it became apparent that the galvanized sheet steel deck installed on the Huey P. Long bridge when it was built in the middle 'thirties would continue to provide protection against fire and corrosion for only a few more years. After extensive tests it was decided to replace the original decking with aluminum sheets. The design of the new decking, the method of installation, and other aspects of the work are described in this article.

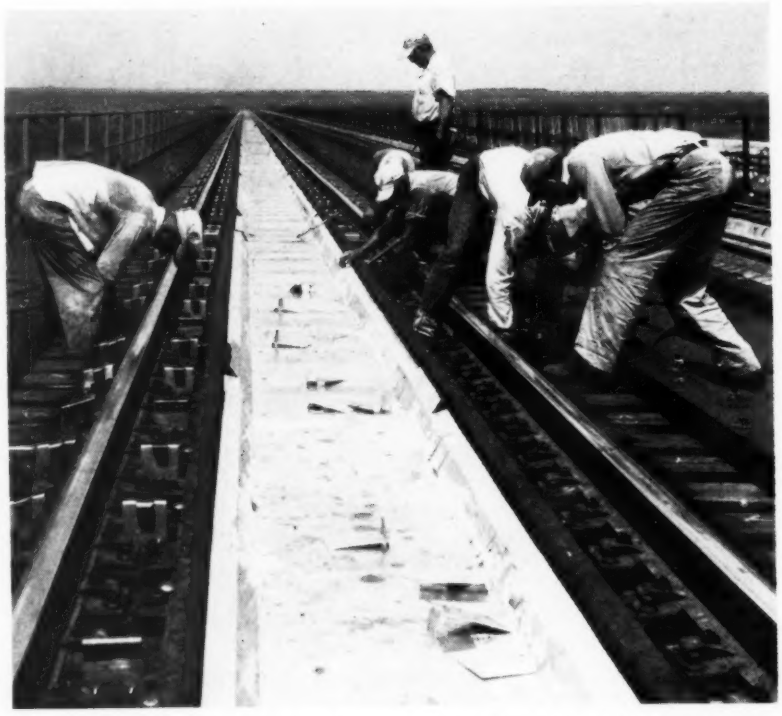
• Unusual design and other engineering problems had to be solved in carrying out a project involving the rehabilitation of the deck of the Huey P. Long bridge across the Mississippi river at New Orleans, La. An important feature of this undertaking, which is now under way, is the application of a covering of aluminum over the entire deck of the bridge to protect it from possible damage due to fire or corrosion. As part of the project a general program of tie and guardrail renewal was undertaken and continuous-welded rails have been installed across the structure.

The Huey P. Long Bridge, a double-track structure, took more

than three and a half years to build and was constructed during the depths of the depression at a cost of approximately $13,000,000. Owned and operated by the New Orleans Public Belt Railroad, it is 4.35 mi. long and in plan is shaped roughly in the form of an elongated "S". The railway tracks follow a vertical curve over the 790-ft. length of the main span and then descend on a grade of 1.25 per cent in either direction. The Texas & New Orleans (part of the Southern Pacific Lines), the Texas & Pacific, the Missouri Pacific, and the Texas-Missouri Pacific Terminal Railroad of New Orleans are all user lines that operate across the bridge and over the tracks of the New Orleans Public Belt to expedite the movement of passengers and general freight into and out of New Orleans.

Planning for the present redecking project began in 1943, when it was determined by routine inspection that the galvanized steel sheets originally placed over the ties and under the rails when the bridge was completed in 1935, would be able to provide adequate protection for only a few additional years. The engineering firm of Modjeski & Masters, which designed the bridge, then undertook the task of locating a longer-lasting material for the deck than the galvanized steel sheet originally installed.

The material selected for this purpose had to be completely fireproof, as it would be required to protect the creosoted pine bridge ties from hot ash, fire bricks, or hot brake shoes that might be dropped from passing equipment. The problem of reducing corrosion of the structural parts of the bridge beneath the deck was also of prime importance. Hence, a function of the decking would be to ward off the highly-corrosive attack of brine drippings from refrigerator cars, as well as sewage from passenger cars.

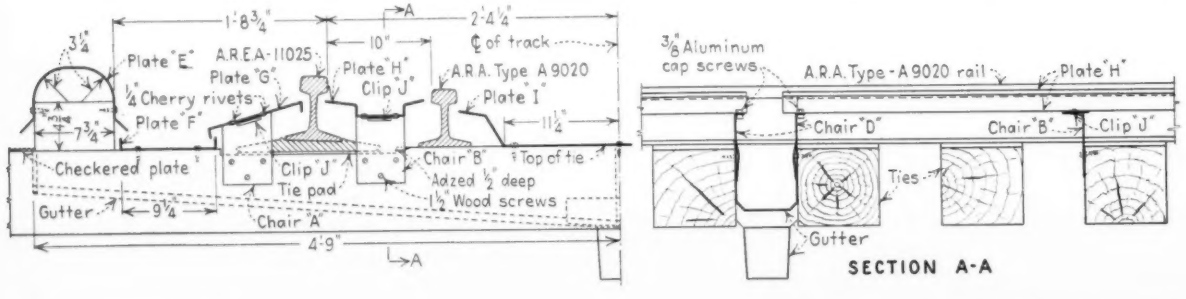


View showing Plate I in place and the chairs for Plates G and H being installed

Numerous manufacturers of a wide variety of different types of sheet materials were requested to furnish specimen sheets to be used as test panels on the railroad deck for an indefinite period of time. These materials underwent actual service tests ranging from three to four years. After the testing period was completed and the results compared, it developed that, corrosion-wise, all the aluminum panels tested were in very good condition. Alclad 4S and 52S sheets were selected as the most suitable materials for the purpose. Ultimately, Alclad 4S was specified for the decking.

While the thorough testing period was in process, the designers, aided by the engineering departments of the user lines and by additional engineering services furnished by Aluminum Company of America, approached the project from the design angle to determine the requisites that had to be fulfilled before undertaking the job of actually applying the decking to the bridge. Regardless of the outcome of the testing operations, there were roughly six major design problems that had to be solved:

1. A continuous deck was needed to provide protection for the ties and the supporting steel structure below.
2. Adequate control of drainage from the decking was necessary.
3. The deck had to be designed for "on location" assembly and without the need for special metal-workng equipment in the field.
4. The deck had to consist of sections which could readily and quickly be re-



Drawing showing arrangement of aluminum sheets being placed on the bridge

Fastening with wood screws a supporting chair for Plate G

Riveting one of the two clips to the underside of Plate G

moved when ties are to be inspected or replaced.

5. The design had to permit the continued use of the established railroad block signal system and the making of new provisions for broken-rail protection.

6. Freight and passenger traffic had to be maintained while the decking was being placed.

To give the bridge and the track structure complete protection from guardrail to guardrail, a series of overlapping aluminum sheets formed in the manner shown by the drawing and photographs were designed. The only surface gaps in the decking from one end to the other are at the drain troughs that run perpendicular to the rails. These troughs are placed at approximately 120-ft. intervals along the deck to provide an adequate number of collection points for deck drainage. Fitting snugly down between two adjacent ties, each trough conducts the runoff of brine, water, etc., from the decking and funnels it through an elbow and downspout pipe 4¼ in. in diameter. Since the downspouts are located to clear the steel girders and floor beams of the bridge and extend 8 ft. below the bottoms of the ties, there is no opportunity for the brine to come in contact with any of the structural steel.

Before the new aluminum decking could be installed, the badly corroded galvanized steel sheets, had to be removed. Simultaneously, as stated, a program of general tie, track, and guardrail rehabilitation was put into motion. The running rails were first removed from the bridge, cropped and welded into lengths of approximately 1,000 ft., after which they were brought back to the bridge on push cars and replaced on the original tie plates. These lengths of the original rail were alternated with similar lengths of new rails which were needed to make up for the cropping and the old rails that were culled out because of wear or other reasons.

The actual reconstruction of the deck was started in January, 1950. The first operation was to remove the steel guardrails and place them in sections on the sidewalks at either side of the tracks. The old galvanized steel decking was then loosened by removing the holddown screw spikes. The running rail with the tie plates attached was then snaked aside to permit the use of a machine to adz the bearing areas of the ties, and also to install the drain troughs between the ties. The ties were adzed to a depth of approximately ½ in. to remove all damaged timber and level the bearing surfaces. All top surfaces of the timber ties were coated with an asphalt mastic and ⅜-in. tie pads were then positioned on each tie-plate bearing surface. The pads were coated with mastic on both sides. The rail, as welded into continuous lengths, was then replaced, using new screw spikes, and the guardrails were relaid. Once both running rails had been prepared in this manner, the track for that particular section was ready for the placement of the aluminum decking.

Installing the Decking

As soon as the old decking was removed and the track prepared in a sizeable area, Plate I (see drawing) was installed between the two inside guardrails. This was done to restore, as soon as possible, a certain amount of fire protection while the other work was in progress. The supports, or chairs, for Plates G and H were then secured to the ties by means of 1½-in. wood screws. Being 8 ft. 2 in. in length, one plate, G or H, covers six ties at the 16-in. center-to-center spacing. For stability, four chairs of .081 in. thickness (12 B&S gage) were used under each full-length G and H plate.

Applying asphalt mastic to the ties before placing Plate F

Using a pneumatic screw driver to fasten Plate F to the ties

Plate G is .081 in. thick, while all the other plates in the deck are .064 in. thick (14 B&S gage).

The arms of the two middle chairs slide into clips located on the underside of both Plates G and H, the ends of which are then fastened to the end chairs with aluminum cap bolts. This combination of plate and support was born of necessity, since both Plates G and H must be removed with ease before the ties, tie plates, bolts and spikes can be inspected. Plate F was then fastened directly to the ties beside the timber guardrails; and finally Plate E, which covers the timber guardrails, was fastened into position to complete the decking.

Placement of the decking has been arranged in such a manner as to minimize interference with the movement of traffic over the bridge. During the 8-hr. work day there is always one live track, and when the decking crew leaves at night both tracks are operated for the next 16 hr. without any interference.

To ease the handling and assembling of the large amounts of aluminum sheet required for the decking, all the sheet sections were fabricated in 8-ft. 2-in. lengths that provide 8 ft. of deck coverage with a 2-in. overlap. Field sawing is required to shorten the 8-ft. 2-in. pieces in some cases where there is a variance in the normal distance of 120 ft. between the troughs and the expansion joints. In addition, the long gradual curves on the approaches have made it impossible to use the full 8-ft. 2-in. pieces at all times.

Two oblong holes were punched 2 in. from each end of Plates G and H, the removable sheets, for chair attachment and to allow for some tolerance and expansion. Two clips were riveted to the undersides of both plates to permit the top arm of the fastening chairs to slip in and out instead of anchoring the plate permanently with bolts. Sawing, hole punching, and riveting are the only three fabricating operations that are done on location. When shipped from the fabricating shop to the bridge all sheets are pre-formed as shown in the various photographs.

The entire operation of installing the decking was designed to avoid the necessity for special craftsmen. The regular track and bridge crews of the New Orleans Public Belt have been used at all times. All tools used are of the pneumatic type, permitting them to be moved over a wide area when used with a track-mounted air compressor.

In order to prove the suitability of the design, the production methods, and the proposed installation procedures, a 400-ft. pilot test section of the new deck was placed on the bridge during October, 1949. Full-scale operations were begun in late February, 1950, and will be continued as long as weather permits. Based on the present rate of work, it is predicted that the entire aluminum decking will be in place by the early part of 1951. More than half a million pounds of aluminum in the form of decking, drain troughs, supports, and assembly items will be used on the bridge and its approaches once all the new decking is in place.

The Huey Long bridge is owned and operated by the New Orleans Public Belt Railroad which is a publicly-owned and operated switching line that serves the port and industries of New Orleans.

This article is based on material and information furnished by E. J. Garland, general manager, and E. L. Mire, chief engineer, of the New Orleans Public Belt, in conjunction with representatives of the various user lines, the Aluminum Company of America, and Messrs. Frank M. Masters and C. W. Hanson of the firm of Modjeski and Masters.

Personnel Relations
As an Aid to Greater Efficiency

By L. W. HORNING
Vice-President, Personnel and Public Relations
New York Central System
New York

Here is an abstract of an address that was presented before a joint session of the Roadmasters' and Bridge & Building conventions in September. So much favorable comment was heard at the meeting following its presentation, and so many requests for copies have been received, that it was decided to give it wide circulation through the medium of this magazine. It contains, in a nutshell, the basic elements of the modern approach to the problem of personnel relations. There is no better way for a supervisor to get the best performance from his men than to put into every-day practice the tenets laid down by Mr. Horning.—Editor.

• At this time, when such great headway is being made in the application of mechanized techniques, we cannot afford to neglect the other side, the non-mechanical side, of our efficiency problem. In other words, while we adopt mechanical improvements in order to do a better job, are we doing everything we can to insure that the human element in our productive team is functioning equally well? No program for all-out efficiency, regardless of how many machines it may provide, can be thoroughly successful unless it takes account of the men who are still the basic component in maintenance-of-way work.

This, primarily, is where personnel relations enter the picture. As practiced by the managements of an increasing number of progressive concerns, the pursuit of a personnel relations program involves the forming and carrying out of policies conducive to good feeling and therefore to good work.

My intention here is to dwell principally on the things which people in supervisory positions can do to increase efficiency through the maintenance of favorable personnel relations. Let me acknowledge immediately that your field of endeavor presents special problems and difficulties, that some of the formulas which have worked elsewhere may not be nearly so effective here. Let me concede, too, that each of you is operating within the framework of policies established by his own company and is not free to change that framework at will. In spite of these qualifications, I believe there are a number of fundamentals in the practice of personnel relations which can be examined with profit by anyone concerned with the direction of men's efforts.

Must Do Good Job

First, we are interested in seeing that the man working for us does a good job. And we don't get very far into the study of personnel relations before we realize that this interest not only is something dear to the heart of corporate management; it also promises substantial social benefits for the whole community. For the man doing a good job—and receiving the pay and recognition that it merits—is a happier man in every department of his life, a better member of his family, and a better citizen of his community, than he ever could be if he were doing a poor job.

Thus, our prime task boils down to one of helping men to do a good job. I say "helping," because that is the only way in which the task can be performed with any degree of permanent success. It is true that, for longer or shorter periods of time, men can be coaxed, forced, frightened, bribed, or tricked into doing a good job against their will; but the only circumstance under which a man will consistently do his best is that of actually wanting to do his best. And until we have helped a man feel that way about his job, by providing him with sufficient motivation, we haven't really tapped the resources of effective personnel relations.

The question of how to provide this needed motivation is, of course, basic to the entire discussion. It is hardly necessary to point out that money isn't the whole answer. We know that present wage levels—the highest on record in practically all kinds of work—find greater dissatisfaction and poorer spirit among employees in many fields than at any time in recent years. Good wages are essential if we are to have good employees doing a good job, but they don't in themselves give assurance of successful personnel relations. Something else is needed.

To put it as simply as possible, and in terms common to our own experience, that vital "something else" which a man must get from his job before he can give his best to it, takes in the things that a human being craves and needs simply because he is a human being.

First among them we might put the desire which every man has for personal dignity. Everybody wants to feel that he amounts to something, that he has worth as a person, that he is important to the operations of his company. A man's job, being his principal

Ideal Characteristics of the Ideal Supervisor

Personal Appearance

Clean, smart, alert, well-dressed but casual, well-groomed but not foppish.

Personality Traits and Habits

Friendly, knows importance of a smile.
Approachable, congenial, cooperative, sympathetic, and understanding.
Calm; speaks quietly and pleasantly, moves smoothly and easily, has perfect self-control.
Keeps unpleasant or unfavorable reactions to himself.
Tactful, gracious, courteous, and considerate.
Thorough, genuine, clean living.
Flair for the dramatic, but never overdoes it.
Sense of humor.
Seldom interrupts people when they are talking.
Never *overly* talkative.
Easy to know, fair, honest.
Plenty of self-confidence, but never conceited.
Inspires respect.
Maintains dignity, but is not stiff-necked.
Has good mind and memory.

Attitude Toward Himself

Knows his faults and shortcomings and tries to overcome them.
Never takes himself too seriously.
Can take defeat in his stride.
Humble, modest, seldom talks about himself.

Attitude Toward Others

Finds others very interesting.
Respects other people's opinions.
Knows how to make others feel important.
Likes other people.
Likes to hear others talk.
Gives others full attention when they talk.
Looks directly at people he is talking with.
Willing to stand or fall on his opinions, but never expresses them just to be talking.
Always has good reason for what he says.
Doesn't beat around the bush, but gets to the point.
Tolerant of the shortcomings of others, mindful of his own.
Open-minded and can be convinced by facts.
Likes to lead, likes to help others.
Avoids petty prejudices and narrow concepts.
Never makes rash promises.
Avoids sarcasm and wisecracks.
Gives the other fellow the benefit of the doubt.

Attitude Toward His Job

Is enthusiastic, hard working.
Likes a tough job or test of his ability.
Knows importance of having the full facts.
Knows importance of accuracy.
Knows importance of punctuality and orderliness.
Boosts his company.
Finds his work is fun.
Knows how to help others get fun out of their work.
Isn't afraid of long hours when necessary.
Often puts his job and his employes above all else.

Pointers on how to be a better boss are summarized in a desk-top card prepared by New York Central for supervisory employees. Part of the card is reproduced here

single activity in life, naturally has to be the source of most of whatever self-respect he is to achieve. If his job doesn't make him feel that he is somebody, what will?

Second, man needs to enjoy a sense of accomplishment in his work. Whether his work is mental or physical, routine or constantly changing, he requires some assurance that it serves a useful purpose, that it does some good. Without this assurance, his work doesn't make sense; while it may afford the worker a living, it becomes a chore that he resents, rather than a productive effort that he enjoys.

Third among the basic human needs which the job should satisfy for the jobholder is that of feeling that what he does is appreciated. In other words, a man can't work in a vacuum. He needs to receive recognition for his efforts. He may know, himself, that he's doing well; but that isn't enough. He wants to be told now and then that he's doing well.

Whether or not a job fills these three needs—for dignity, for a sense of accomplishment, for appreciation—depends largely on the attitude of the company, as expressed by the various levels of management and supervision, towards its employees.

By and large, the attitudes of supervisors directly in contact with rank-and-file employees will have the greatest effect, but this does not mean that personnel relations begin and end with the front line of supervision. From the ground floor level of supervision on up to the top executive of the company, no one in a supervisory or management position can excuse himself from responsibility for the state of affairs prevailing between the company and its workers.

How Do You Rate?

Let's inquire briefly as to how we measure up in some of these matters that affect the satisfaction of workers with their jobs. The subject is important because upon this degree of satisfaction will depend, in large measure, the effectiveness of our personnel relations in promoting greater efficiency.

First, how much self-respect and sense of personal dignity do we foster in our employees? The answer to this question will be found in our own attitude—inward as well as outward—towards these employees. Unless the worker is respected as an individual by his boss, he is not likely to feel any great degree of self-respect, nor to associate himself with the idea of doing a good, respectable job.

It isn't enough, in this regard, to make an occasional show of so-called "democracy" by going among the men and calling a few of them by their first names. Doing so is a perfectly good thing, provided it is merely the outward sign of an inner conviction that all men are entitled to decent, friendly treatment. But, in itself, it isn't enough. If the boss doesn't, down in his heart, believe in his men, he will not be effective in leading them.

In connection with the need which every man has for self-respect, and for respect from others, perhaps I should say a word here about the respect which supervisors and officials should enjoy from the men under them. Such respect, which can only be earned by competence, and cannot be extorted by force or fear, is certainly essential if efficiency is to be maintained. This suggests that the utmost care be exercised in selecting men for supervisory positions.

While on the subject of employees' respect for their supervisors, I cannot resist mentioning a mis-

take which many supervisors—and higher officials, too—make, one which invariably costs some measure of their subordinates' respect for them. I refer to the practice of explaining policies or decisions, which at the moment may seem unpleasant or even unreasonable, by blaming them on a higher management which, it is alleged, doesn't understand the real problems involved. In other words, this old approach was the same as saying "I don't agree with this, boys, but some brass hat in the front office wants it this way, so we have to do it." This type of buck-passing, I suspect, doesn't fool many people, among employees or anywhere else. If a man is big enough to be a leader of men, then he should be big enough to explain frankly the reasons why certain policies have to be enforced.

Now we come to the need of men for a sense of accomplishment. What are we doing to help our employees feel that they are doing something worth while? Do we make sure that each employee understands how the work he does fits into the bigger picture of our company's operations? One of the most inexpensive and yet most profitable things we can do for our employees is to let them know what's going on. If plans change and we transfer a force of men from one job to another, they'll feel a lot better if they're told why the change is being made. If we modify our method of performing a particular operation, workers are much more likely to cooperate with the new method if the whys and wherefores of its adoption are explained to them. It doesn't make much sense for us to want employees to be interested in their jobs and then treat them as if they weren't capable of understanding the most elemental facts about those jobs and the things that affect them.

Pay Check Not All-Important

The third of the basic needs of men which I listed before is that for appreciation. At first thought, it may seem as if a man's pay check ought to be indication enough to him that what he does is regarded as of some worth. If a man were so constituted that he would stop to think, every pay day, of just what that sum of money represents, then the pay check might be enough. But man just isn't constituted that way. To him the pay check is something material; he still has a need for recognition that is more personal, more individual. He can't stand to be lost in the crowd, a mere number on the payroll.

How do we go about making it possible for him to satisfy this need? Are we expected to pamper and coddle workers simply because we realize that they are human beings with human needs? The answer to the second question is a vehement "no". Workers don't want coddling, and it is no substitute for the sane, adult treatment which they do want.

The answer to the first may take a variety of different forms, depending on the people and the situations involved. Probably the guiding principle underlying all solutions to the problem would consist of never being slow to offer commendation for a job well done. A word of sincere praise, saved for the accomplishment that deserves it, but given generously when due, makes the recipient feel that his efforts in doing a good job are worth while.

It should go without saying that there are also more tangible ways of recognizing achievement. It is hardly necessary to point out the soundness of basing all promotions on merit, and the utter folly of basing them on anything else.

Giving Added Responsibility

Many times we overlook the recognition that can be conferred on deserving employees in the form of added responsibility. This need not necessarily wait for the opening up of a promotion vacancy. In the apportionment of work and the amount of confidence vested in the individual worker, there is room for considerable variation, as you well know from experience. When a man is doing well at the job assigned him, it should be possible to broaden that job, perhaps gradually, meanwhile letting him know that he is being entrusted with greater duties because of the abilities which he has shown.

Somewhat allied to the broadening of the individual worker's field of activity as a means of recognition is the whole matter of delegation of authority. While this is, strictly speaking, a question of operating policy rather than of personnel relations, its effect upon the latter is so great that I would like to mention it here. Lack of delegation of authority is one of the most frequently encountered signs of weakness in a working organization. The men at each level of supervision are being paid to exercise authority and bear responsibility. We are wasting their pay and their time if we don't give them the authority to exercise and the responsibility to bear.

I have called attention a number of times to the fact that the elements making up a personnel relations program must come down from the top, that you can't begin and end a personnel relations policy at the lowest level of supervision. To this idea I would like to add the caution that personnel relations must not be considered a strictly one-way street. In order that the policies formed at the top and passed down may be timely and realistic, there must be a constant flow of information and suggestions in the other direction—from the bottom up. Every man in the company should be able to go to his boss with a suggestion, or a question, or a "gripe," and be heard and answered.

Let me caution you that the benefits to be derived from a personnel relations program do not come overnight. They require consistent and persistent adherence to a plan of action that has been carefully and soundly thought out. They don't come without effort, and they don't come without difficulties and discouragements encountered in the process. But, if the plan is sound and the application conscientious, nothing can stop them from coming; and, in terms of the efficiency we are striving for, the benefits are eminently worth while.

Be a Better Boss

A correspondence course in how to "Be a Better Boss," has been prepared by the New York Central System for those of its supervisory employees "who desire to improve their executive skills and talents." The course is comprised of 10 lessons, all bound together in a single paper-covered pocket-size book. Mr. Horning has kindly consented to make copies of the book available to readers of this magazine who may desire to have them. Requests for copies should be addressed to him at 466 Lexington avenue, New York 17, N.Y.

Left—Large tires on widely-spaced wheels permit Trak-Kleener to straddle both rails when picking up dirt between rails, and to climb over tracks with ease. Right—Each machine first makes a pass along outside of rails, casting dirt to center of track

Machines Simplify Yard-Cleaning

North Western uses two off-track machines to pick up refuse from yard tracks and load it into gondola cars. These units are used as a team at Proviso yard to clean two tracks daily. Improved working conditions for yard switchmen gain full cooperation of yardmaster in relinquishing the tracks to be cleaned.

• Ever since the Proviso (Ill.) yards of the Chicago & North Western were built in 1927, the track forces of that road have found it a difficult and costly task to keep them free of debris. Because this was a slow and laborious task it was a problem to take any of the tracks of the classification yard out of service long enough to do necessary cleaning work. Siftings from car ladings, dirt droppings from undercarriages, and front-end cinders and coal from the steam locomotives formerly operating in the yards, have built up an accumulation of refuse that has in some locations completely covered the ties to varying depths. The result was that visual inspection of the condition of the ties, rails and fastenings was often impossible, and maintenance work was hampered.

Obviously, the cleaning of the tracks by hand was so costly as to be prohibitive. Attempts were made to pick up the accumulation of refuse by using a locomotive crane equipped with a clamshell bucket. This method was not satisfactory because it was not only slow but also frequently left holes between the tracks that had to be smoothed out by the track forces to prevent accidents. Finally, in the fall of 1949 the road experimented with a pilot model of an off-track machine known as the Trak-Kleener, built by the Pettibone Mulliken Corporation, Chicago.

Cost Figures Given

As a result of its experience with the pilot model, the road has purchased two improved machines of this type and has worked out a method of using them as a team for cleaning two yard tracks a day. The cost of the cleaning work with this equipment is 4.5 cents a track-foot, or about $0.76 per cu. yd. of debris picked up and loaded in gondolas. Although the North Western has not developed any cost figures for doing this same work by hand, similar work carried out by another railroad in the Chicago area showed a cost of $12.35 per cu. yd. for hand cleaning.

The two machines in use at Proviso yard are each mounted on three axles having large pneumatic-tired wheels, and when in use for cleaning a track the wheels straddle either one or both rails. Each machine consists essentially of a pick-up mechanism, an inclined intermediate conveyor, a swivel conveyor, and a power plant. The pick-up mechanism, projecting forward at the front end of the machine, has in-gathering winged scraper blades and a chain conveyor with a series of curved "dragger-back" blades. The forward ends of the winged scraper blades are 4 ft. 5 in. apart, and are supported on floating plates which slide along the rails. The rear ends of the winged blades are joined by a clean-up scraper blade which rides up and down on the ground and ties on two small shoes. This latter blade can be adjusted for any depth down to the tops of ties. The entire pick-up unit may be raised and lowered hydraulically to a height of 10 in. above the ground level and to a depth of 2 in. below this level.

The pick-up mechanism gathers the refuse and crowds it into the path of the "dragger-back" blades, which drag the material back to deposit it on the lower end of the inclined intermediate conveyor. This conveyor is a troughed rub-

The conveyor is not only swiveled for horizontal movement but also can be raised or lowered to discharge dirt into cars or trucks of different heights. Belt speed can be increased to cast material 5 or 6 ft. beyond the end of the conveyor when necessary

Operations

ber-covered and cleated belt which operates at a faster speed than the pick-up mechanism. When the refuse reaches the top of this conveyor it drops on one end of the swivel conveyor.

The swivel conveyor is about 14 ft. long, is powered by a separate hydraulic motor, and is also a troughed rubber-covered belt with cleats. The free end of this conveyor can be rotated 60 deg. horizontally to the right or left of the center-line of the machine to permit the material to be discharged into cars on an adjacent track. Also the end of the conveyor can be raised from a horizontal position to a height of 13 ft. above the ground to permit discharging the material into cars or trucks of different heights. The belt speed can be increased to cast the material an additional 5 or 6 ft. if the track centers are greater than the usual 13 ft.

The track-cleaning machine is driven through a fluid drive by a 100-hp. Chrysler engine developing a torque of 215 ft.-lb. at 1,200 to 2,000 r.p.m. The fluid drive was selected because it permits the machine, while working, to run into an obstacle without damage; it provides a hydraulic crowding action that reduces wear and tear on movable parts; and affords a simple means of furnishing power to the swivel conveyor.

The operator's cab, the front of which is glass enclosed, is placed at the front end of the machine, permitting the operator to watch the scraper wing blades and to steer the machine slightly to one side when passing rail joints. Both the front and intermediate axles, which are closely spaced, are steerable, thus providing the machine with a high degree of maneuverability, while the large-diameter tires allow the machine to climb over rails with ease.

The method adopted by the North Western for operating its two yard-cleaning machines to clean two tracks a day is as follows: The description of the procedure will start with the sequence of movements involved in cleaning an outside track, to be designated here as track No. 1, and the track adjacent to it, to be referred to as track No. 2. The yardmaster is asked to give up these two tracks for the day. One machine makes a pass along the field side of track No. 1, with the wheels straddling the outside rail, and the second machine makes a pass along the opposite side of this track, with the wheels straddling the inside rail. Both machines cast the refuse material between the rails of track No. 1. In this phase of the operation the machines start at the opposite ends of the track and work towards each other. There is ample clearance for the machines to pass one another when one is stopped and swings its swivel boom away from the center of the track.

With both sides of track No. 1 thus cleaned, one machine is turned so that it straddles both rails of this track, and the other is backed up so that both machines are at one end of the yard and headed in the same direction. A work train, consisting of a locomotive, six gondola cars and a caboose, is placed in position on track No. 2. The machine straddling track No. 1 is then put into operation, casting the dirt from between the rails of that track into the cars of the work train which moves along with it as the loading requires. The other yard-cleaning machine follows behind the work train and cleans the side of track No. 2 that is nearest to track No. 1, casting its material to the center of track No. 2.

Cleans Intertrack Space

Where the classification tracks are on 13-ft. centers, which applies to most of the tracks in Proviso yard, the entire intertrack space gets cleaned by the same passes of the machine as those used for cleaning the areas outside of the rails of adjoining tracks. Where the track centers are greater than 13 ft. 6 in., an additional pass of the machine is necessary. Unless the track centers are 14 ft. 6 in. or more the side of track No. 2 nearest to track No. 3 cannot be cleaned as long as cars are standing on the latter track, because of insufficient clearance.

When the procedure described above is completed, the areas between and outside the rails of track No. 1 are clean and one side of track No. 2 has been cleaned with

Showing typical track condition before the cleaning operation was carried out (above), and same track after (below)

the refuse material from this area piled between the rails of track No. 2. The work train is then moved to track No. 1, one yard-cleaning machine is turned and straddles the rails of track No. 2, and the material between the rails of that track is then picked up and loaded into the cars. The cars are then hauled to a place of disposal where a clamshell crane unloads them.

For the next day's program, tracks No. 2 and No. 3 are taken out of yard service and one yard-cleaning machine passes down the uncleaned side of track No. 2, while the second machine works on the side of track No. 3 nearest to track No. 2, with both machines casting their material between the rails of track No. 3. This work requires about 1½ hr., after which track No. 2 is restored to yard service and track No. 4 is "pulled" and removed from yard operation. The remaining steps for cleaning track No. 3 and two-thirds of track No. 4 parallel those of the previous day. With this arrangement no more than two yard tracks are out of service at one time and interference to normal yard service is minimized.

The cost figure of $0.76 per cu. yd. mentioned in the beginning of this article for picking up and loading the refuse includes the rental of the work train and wages of the crew, depreciation and other costs of the two yard-cleaning machines; gas and oil; and the wages of two machine operators and a foreman in charge of the work. The foreman directs the movements of the work train and machines and makes arrangements with the general yardmaster for releasing the yard tracks. The cost figure does not include either the rental of the unloading crane or the wages of the crane operator because the unloading costs would be the same regardless of the type of cleaning and loading method used.

When in operation the yard-cleaning machines work at an average speed of 55 ft. per min. However, they have four speeds forward and one in reverse. On the highway, the machines have a clearance of 10 in. above the roadway surface and can travel as fast as 30 m.p.h. When loading, the machines have averaged about 60 cu. yd. of material placed on a car in 22 min. Although the classification tracks of Proviso yard are not one mile long, the road is confident that the two machines can clean two miles of track in a day with the method now being used.

While experimenting last fall with the pilot model, the railroad found, by using only one yard-cleaning machine, that the work train could not be kept fully employed. This caused the cost per yard of refuse handled to be too high, so two machines were decided upon.

Because of the smooth ground conditions left between tracks by these machines, working conditions for yard skatemen and switchmen are reported by the railroad to be greatly improved.

All scrap iron and usable material is picked up by the track forces in advance of the cleaning. The track forces in the yard are quick to take advantage of the time that the tracks are out of yard service while being cleaned, and follow up behind the machines with necessary track maintenance work. This work consists of removing the small ridges of refuse along the rails which the machines cannot scrape up, replacing corroded spikes, and tamping up the joints where needed.

The yard-cleaning work is being carried out under the general direction of E. C. Vandenburgh, chief engineer. More direct supervision is exercised by L. R. Lamport, engineer of maintenance, B. G. Packard, division engineer, and H. Mayer, engineer scales and work equipment. H. N. Maas, roadmaster at Proviso, is in direct charge of the work.

Track forces are quick to carry out necessary maintenance work on the yard tracks when they have been taken out of service to permit operation of cleaning machines

Scalloped edges tend to keep plates in close and proper alinement. Scallops are omitted, however, where the plates abut against walls, etc., as shown below

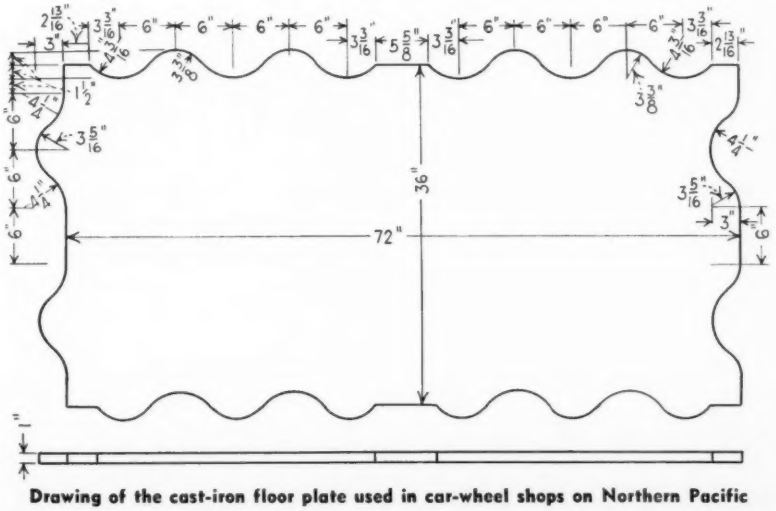
Cast-Iron Floor Plates For Car-Wheel Shops

By L. B. CURTISS
Architect, Northern Pacific
St. Paul, Minn.

• Probably no floors in railroad service are subject to more severe treatment than those in car-wheel shops and wheel-storage platforms. They receive rather constant use, are subject to heavy shocks, and the sequence of operations in the shops is such that the wheels usually travel in narrowly restricted paths to the various lathes and presses.

The Northern Pacific has at various times used heavy planking, wood blocks, and surface-hardened concrete floors in its car shops, but none of these was found to give satisfactory service in the areas subjected to frequent travel of the car wheels.

Cast-iron plates, which are now used in the car-wheel shops and wheel-storage platforms of the Northern Pacific at St. Paul, Minn., Brainerd, Minn., Laurel, Mont., and South Tacoma, Wash., have proven very satisfactory over a period of several years. These plates are 1 in. thick, 3 ft. wide by 6 ft. long, and weigh approximately 700 lb. each, and are a development of the Griffin Wheel Company. The edges are scalloped except where the plates abut against walls, machinery foundations, or tracks. The scalloped edges eliminate long straight joints or cracks and tend to keep the plates in close and proper alinement.



Drawing of the cast-iron floor plate used in car-wheel shops on Northern Pacific

The plates are supported on 6-in. by 8-in. creosoted timber sleepers spaced on 3 ft. centers. A compacted sand fill is placed between the timbers. The weight of the plates holds them firmly in position. They are highly resistant to wear, impact and abrasion, can be used indoors and out, and can easily be kept clean. It is simple to replace a plate in case of breakage; however, breakage has been negligible.

The original cost of the cast-iron plates in place is about 15 per cent greater than for a 6-in. reinforced concrete floor with hardener but the annual cost, based on experience thus far, will be appreciably less.

Snow Fences —

Placing Them to Get Maximum

Extensive tests were conducted by the Rock Island at its Chicago laboratory to learn why snow fences so often are ineffective. This article, based on the laboratory report, describes the equipment, procedure and results of an investigation that points up the fact that there may be some misunderstandings regarding the proper practice to be followed in the control of drifting snow

• After a blizzard on November 18, 1949, had tied up traffic on the Western division of the Chicago, Rock Island & Pacific for four days, W. H. Hillis, vice-president-operations, decided that he was not going to be one of those men referred to by Mark Twain as not doing anything about the weather. He knew that the road had a large investment in various types of snow fences and that the blizzard had shown them as being ineffective insofar as preventing a heavy deposition of snow on the tracks. Being of the opinion that past practice in locating snow fences had been anything but on a scientific basis, he requested T. D. Sedwick, engineer of tests for the road (now retired), to make a laboratory study of the action of snow with fences located at various distances from the track.

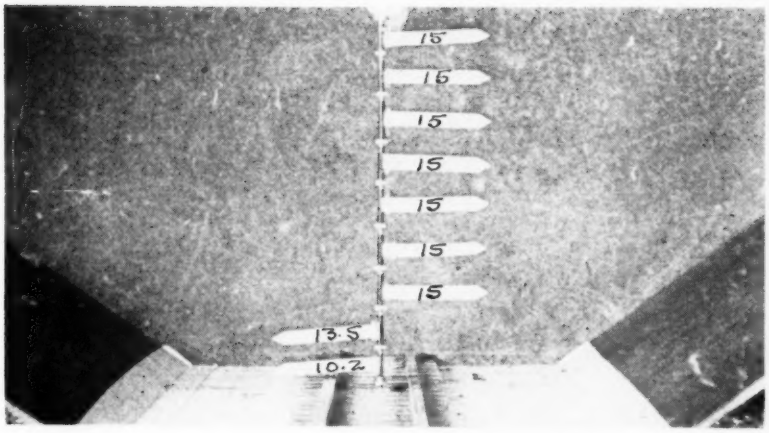
Reports from the blizzard territory showed that the drifts that caused the trouble were largely made up of snow already fallen, which was picked up by wind currents and blown along the surface. Upon meeting a barrier of some type, the snow was deposited and formed drifts. These barriers were of two types—natural and man-made. Among the first type are grass and weeds growing along the fences; tumbleweeds, which roll up and lodge against the fences; brush; trees; and natural earth banks. Artificial or man-made barriers are largely right-of-way fences, snow fences, buildings adjacent to the right of way, and cuts.

In making the tests, attempts were made to determine (a) the most desirable type of snow fence; (b) the most desirable location of fences in respect to cuts; (c) the most desirable distance of the bottom of a snow fence from the ground; (d) the influence of the depth of a cut; (e) the influence of the slope of the sides of cuts; and (f) the effect of wind velocity on drifts.

The apparatus used for the laboratory tests consisted essentially of a wind tunnel with air mover; a snow substitute; and small-scale models, scale ½ in. to 1 ft., of various types of snow fences, railroad cuts and a track placed in the cuts at right angles to the wind current. The wind tunnel was made 28 ft. long and 22 in. by 24 in. in section. It was constructed of Masonite except for one side near the location of the cut which was made of glass to permit observation of the drifting material. The rough side of the Masonite was placed up on the floor of the tunnel to simulate the roughness of the terrain, and the floor was made adjustable to form different desired depths and slopes of the sides of cuts. The tests were conducted for depths of 5 ft., 11 ft. and 18 ft. and for slopes of 1 to 1½, 1 to 4, and 1 to 6.

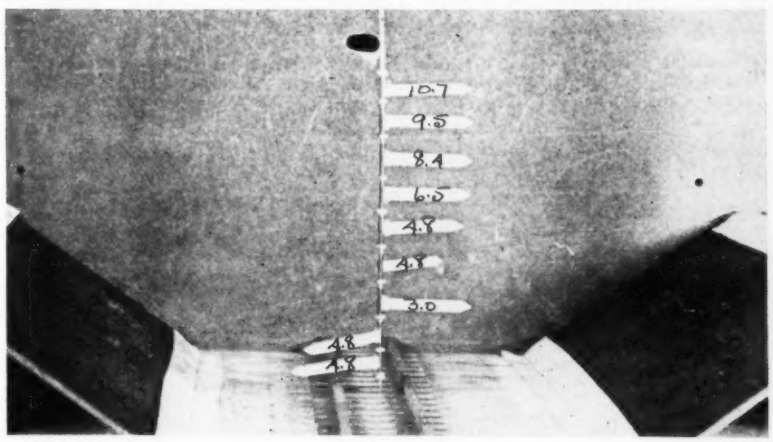
Vermiculite, screened to ⅛ in. in size, was used as a substitute for snow. Several types of fences were used in the tests including the permanent horizontal slat fence, the vertical slat fence, the horizontal slat inclined fence, the solid board fence, the rail fence, the wire fence, and the perforated sheet metal fence.

The wind current was obtained by using compressed air. The velocity of the wind could be varied but a normal velocity of 15 m.p.h. at the cut was used after preliminary tests indicated that the desired information could be obtained with this speed. The velocities of



Opposite page—This snowbound condition was the result of using, as a snow fence, a right-of-way fence located too close to the cut. Also, second fence in background was placed too close to first

In the Rock Island's wind-tunnel tests, using an air speed of 15 m.p.h., air-current velocities were determined at various heights in models of cuts by means of a Pitot tube attached to a sensitive manometer. The picture at the left shows directions and velocities of air currents in a model of an 11-ft. unprotected cut with slopes of 1 to1½. The picture below shows the changes in air-current velocities in the same cut after a slat snow fence had been erected at a distance equivalent to 46 ft. from edge of cut, or 75 ft. from the track



Protection

the air currents were determined at various heights in the cuts by using a Pitot tube attached to a sensitive manometer. To enable the wind currents to be noted, small free-swinging targets were attached to a rod which was placed vertically at the center of the model track in the cut.

Standard practice relating to snow fences on the Rock Island called for a vertical slat snow fence having a total height of 5 ft., with the bottom of the fence 12 in. above the ground. The slats were 1½ in. wide, and were spaced 2 in. apart. In placing these fences, the instructions stated that they shall be erected not less than 100 ft. from the edge of the cut, and a second line of fence shall be erected, only when necessary during the winter, 100 to 150 ft. back of the first line of fence.

From tests made with different wind velocities, it was indicated that the velocity has little influence on the eddy areas and, in consequence, the length of the drifts. However, for each foot of height of the fence above the ground, drifts formed 14 ft. on the leeward side of a horizontal slat fence, 16 ft. on the same side of a vertical slat fence, and 11 ft. from a solid fence. Based on the results of this test, it was determined that snow would be caused to drift 82.5 ft. on the leeward side of a vertical slat fence, 75.5 ft. from a horizontal slat fence, and 77 ft. from a standard temporary horizontal slat fence.

In view of the foregoing, Mr. Sedwick concluded that such snow fences should not be placed closer than 100 ft. to the top edge of a cut, which confirmed the road's present practice, otherwise the drift formed would spill over into the cut. In fact, it was believed that the 100-ft. location appeared too close to the border line of the spillage and that better protection would be provided by installing the fences 125 ft. or even 150 ft. from the edge of the cut.

The tests also indicated that the 12-in. distance from the ground to the bottom of the fence did not form what would be termed characteristic drifts, but formed drifts at a distance from the fence. With the bottom of the fence 6 in. above the ground, desirable drifting took place near the fence.

Insofar as the type of the fence was concerned, there was not indicated any materially different effect on the wind velocity. However, it was found that the location of the fences did influence the wind velocity both at the top of the cut and at intermediate points in it. The greater the distance that the fence was erected away from the cut, the less influence it had on the velocity.

Eddy Currents

The side slopes of the cuts showed the major influence on the wind velocity and on the direction of currents inside the cuts. In all cuts with vertical sides, eddy currents took place in the cuts, with reversal of current direction, irrespective of fence location and type. However, in the case of the 5-ft. cut with slopes of 1 to 1½, 1 to 4 and 1 to 6, the eddy currents were eliminated from the cuts.

In cuts 11 ft. and 18 ft. deep, these eddy currents still prevailed with side slopes of 1 to 1½. However, such currents were eliminated in tests in which an elevated perforated metal fence was suspended within the 11-ft. cut, and with a similar elevated fence of solid structure suspended in the 18-ft. cut. In these tests there was

This model represents a cut, 11 ft. deep, with side slopes of 1 to 1½. Undeterred by a fence barrier of any kind, the air currents in the wind tunnel swept a heavy deposit into the cut

Same cut as at left protected by a fence located a distance equivalent to 75 ft. from center of track. Note that the deposit in this case is even heavier than when no fence was used

Left—Another view of the cut above protected by an elevated-type fence placed in the cut with its bottom at same level as top of cut. The sweeping action of air currents under the elevated fence prevented formation of a heavy deposit

a reversal of current at the tops of the cuts but the currents continued in normal direction at the bottoms.

It is interesting to note that eddy currents ceased to exist in both the 11-ft. and the 18-ft. cuts when the side slopes were made 1 to 4 and 1 to 6. However, in the case of the 11-ft. cut, vagaries in the wind currents occurred when a fence was placed 75 ft. from the center of the track, which was 18-ft. back from the top edge of the cut. With side slopes of 1 to 4, this fence location caused zero eddy currents at the top of the cut, a reversal of currents midway to the bottom, and normal currents at the bottom. In like manner, with a fence located 75 ft. from the center of a track in a cut having side slopes of 1 to 6, resulting in the fence being located only 3 ft. back from the top edge of the cut, there was a reversal of eddy currents midway of the depth of the cut, with normal direction of currents at the top and the bottom of this cut.

It was also noted that there was a general tendency for the velocity of the eddy currents to be reduced as the side slopes were made steeper, regardless of whether the eddy currents were in normal or reverse direction. With the fence placed 75 ft. from the center of the track, there was a positive indication of a reduction in the velocity at the top of the cut proper as compared with fences placed at greater distances. Also, there was a general trend of increased velocity of wind currents at the tops of the cuts as the distance of the fence was increased from the center line of the track.

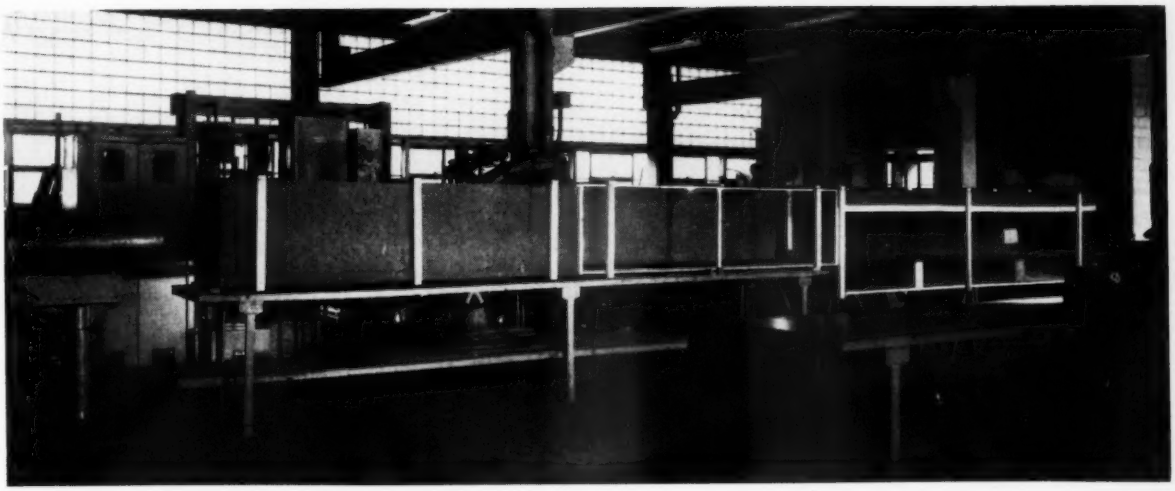
Snow Drifting

The tests showed that, with all three depths of cuts having vertical sides and with no fence used, an undesirable deposit of snow took place in the cuts. In general, the presence of fences, regardless of their location, appeared to aggravate this deposition of snow in such cuts.

In the tests of the 5-ft. cut with slopes of 1 to 1½, 1 to 4, and 1 to 6, it was found that drifting in the cuts was greater, or at the best no less, with the presence of a fence, regardless of its location, than with no fence at all. Hence, it was concluded that cuts can be kept satisfactorily clean without any fences if the side slopes are made at least 1 to 4.

In the tests of the 11-ft. cut with slopes of 1 to 1½, with and without fences, a heavy accumulation of snow took place in the cuts. With these slopes, but using a fence within the cut at an elevated position, only a slight deposit took place in the cut. With slopes of 1 to 4 and with two fences located 150 ft. and 225 ft., respectively, from the center of the track, some improvement was shown over the 1 to 1½ slopes, but there was still more deposit than when using no fence. When no fence was used in the cut with slopes of 1 to 4, the only deposit was that held by the track rails. The results of the test of the 11-ft. cut having slopes of 1 to 6 were about the same as the cut with the 1-to-4 slopes.

In the tests of the 18-ft. cut, there was an undesirable deposition of snow in the cut having slopes of 1 to 1½ with or without fences. However, when a fence was used within the cut at an elevated position, there was only a



Rock Island's wind tunnel, shown here, is 28 ft. long, 22 in. by 24 in. in section, and is built of Masonite and glass

slight deposition of snow in this cut. With slopes of 1 to 4 and 1 to 6, heavy snow deposits occurred, most probably due to the long slopes of this cut, although, as the slopes were increased, these heavy deposits occurred largely on the windward shoulder of the cut and did not bury the track under unduly deep snow. While it may not be considered practical, indications are that the elevated-type fence within the cut would be the most desirable arrangement that can be used in cuts of this depth.

Snow Storage

The report of the tests pointed out that the major purpose of the ordinary standard snow fence is to provide storage for windblown snow. However, it should be borne in mind, according to the report, that in a heavy storm the storage capacity which the fences would be capable of providing is comparatively small as compared with the total amount of snow blown along the ground surface. In such a storm the storage capacity of the fences would soon be filled causing additional snow blown over them to be deposited in the cuts, that is, unless the side slopes were such as to make the cuts self-cleaning.

It was also pointed out that the storage capacity of snow fences can be increased by the elevation of the fence after the storage capacity at the lower level has become exhausted. But, if this practice is to be followed, the fence should be moved 14 ft. back (away from the track) for each foot that it is elevated to prevent the drifts thus formed from spilling over into the cuts. This raises the question as to the practicability of relocating and elevating the fences after the first storage capacity has been filled. Increased storage capacity can also be provided by the use of two lines of fence, properly spaced in respect to the cut, and with proper spacing between the two fences.

The tests show that snow fences placed at an elevated position within the cut itself will provide increased siphoning or velocity of the wind under the fence tending to give a greater sweeping action than when placed at the standard height above the ground, but such fences do not provide any storage capacity.

Recommendations

In summing up, the report states that, while it is not claimed in any way that the investigation has developed any new methods or facilities for the control of drifts, it has served to emphasize the fact that the most advantageous means of controlling drifting snow are frequently not used.

The recommendation is made that, where practicable, the side slopes of cuts of all depths be decreased to at least 1 to 4 and, in the case of an 18-ft. cut, preferably to 1 to 6.

If a fence is to be used in a cut having a 5-ft. depth, it should be placed at least 125 ft. from the center of the track, or 100 ft. from the top edge of the cut.

If a fence is to be used at an 11-ft. cut, the most advantageous arrangement would be the use of an elevated fence within the cut on the windward side and with the bottom of the fence on the same level with the top edge of the cut. For protecting a cut of this depth, the use of two lines of fences does not appear to show any decided advantage over the results shown with side slopes of 1 to 4 and 1 to 6 without the presence of fences.

In the case of the 18-ft. cut, side slopes of 1 to 4 and 1 to 6, without the use of fences, showed good results but the deposit to be expected will continue undesirably heavy. This deposit will be on the windward side and there is the possibility that, except in extremely heavy storms, this storage space might be sufficient to protect the situation. The best arrangement for a cut of this depth would be to provide side slopes of at least 1 to 4 and an elevated fence within the cut.

Referring to past bad snow-drifting conditions, the report stated that a large part of the trouble was caused by neglecting right-of-way fences, building them of snow-fence construction, and permitting accumulations of trash and weeds along the fence line. Noncompliance with standard instructions for placing snow fences back 100 ft. from the tops of cuts and the erosion of side slopes in such a way as to cause them to approach the vertical were mentioned as other causes of trouble. If it is not possible to avoid vertical side slopes, steps should be taken to place them as far away from the track as possible to allow a maximum amount of storage space.

Selection and Care of

By F. C. THORN
The Garlock Manufacturing Company
Palmyra, N. Y.

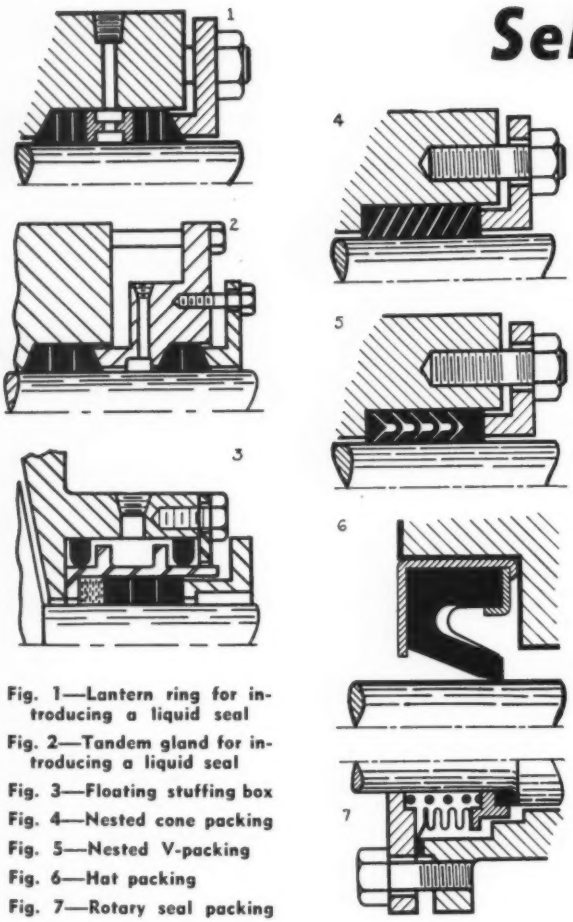


Fig. 1—Lantern ring for introducing a liquid seal
Fig. 2—Tandem gland for introducing a liquid seal
Fig. 3—Floating stuffing box
Fig. 4—Nested cone packing
Fig. 5—Nested V-packing
Fig. 6—Hat packing
Fig. 7—Rotary seal packing

If pump packing is to give effective and trouble-free service—it must leak slightly. Incomplete adherence to this principle causes most of the diffficulties which mechanics and water-service repairmen experience with pump packing. All too many repairmen believe, erroneously, that packing glands must be pulled up tight. This article tells why that practice is wrong and how packing can be made effective without it.

• All too often pump stuffing boxes seem to require more time, effort and money to keep them operable than correctly designed and properly installed equipment should require. The conventional stuffing box, however, can be made to function much better than it usually does, if packing user and packing manufacturer can be brought to a clearer understanding of each other's problem.

The most important and yet the least understood fact regarding centrifugal-pump packing is that it inevitably leaks. If this sounds like heresy to the packing user, let him give some thought to the nature of the problem. A liquid by its very nature penetrates any kind of a crevice, no matter how minute. If liquids are to be excluded from the stuffing box, it follows that the packing material and the shaft must be in tight contact. Packing materials are so plastic that such a degree of contact is easily attained; all one has to do is to pull up on the gland nuts. But this sort of contact is incompatible with high-speed relative motion. The only possible effect of such motion in the presence of this tightness is to destroy the packing or the shaft or both. Such needless destruction unfortunately is taking place almost wherever pumps are used.

If destruction is to be avoided, a crevice must be left through which fluid can pass in accordance with the laws of fluid flow. The main thing is to recognize the necessity for the leak and to design and repair accordingly.

The function of a packing on a high-speed shaft is to throttle, not to eliminate, leakage. The situation is not hopeless, however. The pump designer has several weapons he can use to help. The first and most important is that he can decide what liquid is going to leak. If he does not like the idea of a particular fluid escaping through the packing, he can substitute a more desirable one. The problem in one case is neatly solved by injecting a suitable liquid into the center of the packing and allowing it to flow both ways from the point of admission. This arrangement is known as a liquid seal, and the H-shaped metal ring which is introduced into the stuffing box (Fig. 1) opposite the point of liquid injection is known as a lantern ring. The tandem gland (Fig. 2) offers an alternative method for introducing a liquid seal. The liquid may be the pump fluid itself, tapped from the discharge line, or water or oil from an independent source. Some admixture is unavoidable but the amount of such admixture is often grossly overestimated. **If properly adjusted, most centrifugal pump packings can be made to run cool on leaks of a few drops a minute, or even a few drops an hour.**

Many engineers carelessly refer to a water seal as a "water-cooled" stuffing box. A little reflection will show that the amount of heat removed by such an unimportant trickle may be disregarded. The real function is to make possible a slack adjustment of the packing and thereby avoid heat formation. The injected fluid functions, not as a cooling agent, but as a lubricant. There are water-cooled stuffing boxes also, but they are water-jacketed (Fig. 3). Another excellent arrangement is the continuous introduction of a light grease by means of a spring-loaded or weight-loaded grease cup. It is only rarely that some sort of suitable sealing liquid cannot be found, if the will exists to find it. But where no admixture can be tolerated, there is nothing left but to accept a certain amount of leakage of the pump fluid through the packing.

The task of the packing manufacturer has been simplified if the designer and user have each done their part properly. Too often, unfortunately, the packing manufacturer is asked to make up for all the errors and omissions of both designer and user.

The packings which the manufacturer is prepared to offer may be classified broadly into three categories: (1) Automatic, i.e., tightened by the fluid pressure it-

Pump Packing

self; (b) spring-actuated; (c) stuffing-box types. The first two categories have their field of usefulness in connection with pure water and oil. Automatic types include nested cone packing (Fig. 4) and nested V-packing (Fig. 5). Spring-actuated types include hat packing (Fig. 6) and rotary seal types (Fig. 7). However, the majority of packings used are of the type intended for installation in a stuffing box and for intermittent adjustment by a gland.

The requirements for an ideal stuffing-box may be summarized as follows:

1. It should be sufficiently plastic to conform closely to the shaft under the influence of gland pressure.
2. If drawn into too intimate contact with the shaft, it should possess means of freeing itself without production of destructive friction and temperature.
3. It should contain nothing that is dissolved, emulsified, swelled, or weakened by the sealing liquid, or by the pump liquid if no seal is being used or if the seal should become inoperative.
4. It should not abrade or corrode the shaft.
5. It should be sufficiently elastic to absorb whatever shaft gyration is not eliminated by design.
6. It should lose volume slowly so as not to require frequent renewal.

Any packing will run hot on a small leak and cool on a large leak. However, some packings are better adapted than others to withstand the temperatures associated with small leaks. Rubber packing is unsuited for a high-speed shaft because it is easily overtightened, whereupon it seizes the shaft and, having a high rate of thermal expansion, keeps on getting tighter.

Braided packings are practically standard for centrifugal pumps because they have many advantages. They are cheap and lend themselves well to making rings in the field, thereby avoiding the necessity for carrying a large stock of molded parts.

However, this type of packing would be worthless without a binder of some sort. The usual type of binder is a semisolid fat or wax, with a liberal dusting of graphite on the outside and sometimes between yarns. The mixture is quite commonly referred to as a "lubricant" but not entirely correctly, since the true lubricant is usually the escaping liquid.

The function of the binder is to fill the interior of the packing and prevent leakage at this point; along the wearing face it serves as a surface leveler, producing a smooth face parallel to the shaft but more or less completely separated from it by a film of the escaping fluid. **If a packing is overtightened, this fluid film is pinched out, which brings the binder everywhere into contact with the shaft.** The effect is usually to raise the temperature, thus causing some of the binder to melt and exude from the stuffing box, thereby restoring the fluid leak as before.

The self-correcting or fool-proof feature of braided packing is the most important property which it possesses for high-speed service. The chief disadvantage of braids is a tendency to lose the binder when employed at low-leakage rates. This volume loss also makes the proper location of lantern rings, etc., difficult to maintain. Braided packings should, in general, be operated with liberal leaks.

Plastic packings, consisting of a mixture of loose asbestos fiber, graphite, and a binder with the inclusion of metal particles optional, are essentially the same as braids but in different form. The grease-bonded types having end rings of metal foil are capable of surprisingly long service—even at low-leakage rates.

Metal foil packings are very durable and, if properly cared for, may last the lifetime of the pump. They are not quite as close fitting as the other types, and have been used perhaps more for oil service than for water service. When used on water at positive pressure, their tightness can be improved by injecting graphite grease via a lantern ring and a grease-cup or grease-gun fitting, known incorrectly as a "grease seal".

Metal foil packings are stable as to volume and permit the accurate location of lantern rings, etc. They are not much given to seizure since the thermal expansion is about the same as the surrounding metal parts, and, if made from soft metal, they cannot abrade. Their chief disadvantages are their relatively high cost and the fact that they do not lend themselves as readily as other types to preparation of rings in the field. Therefore, it is frequently necessary to carry molded sets in stock.

Once the necessity for controlled leakage is clearly recognized and proper sealing arrangements are made to take care of those cases where the fluid itself is not a suitable lubricant, the selection and maintenance of packing are relatively easy.

Factors Contributing to Pump-Packing Failures—and Recommended Remedies

LOST LANTERN—It is common practice for mechanics to remove packing above the lantern and on feeling metal (the lantern), concludes that the bottom of the stuffing box has been reached; hence they repack the stuffing without removing the lantern and packing below it. Instead they should remove lantern before repacking.

UNCONNECTED LANTERN—(A) If the pump has vacuum or lift on suction then the lantern should be connected to discharge; (B) if it has a flood suction and high discharge, the lantern should be connected to suction; (C) if there is high abrasive content in material pumped then the lantern should be connected to fresh water with a five-pound differential over normal S/B (stuffing-box) pressure; (D) if lantern is not connected as in A, B or C then supply water-pump grease in lantern through a grease fitting, preferably a constant-feed, gun-fill cup. In cases where abrasive content is to be considered in fluid pumped—use an emulsifying grease or paste vegetable oil soap.

PRACTICE OF "ADD-A-RING"—Only in extreme emergency should a ring of packing be added to a S/B that is leaking and no longer contains enough packing to allow sufficient gland adjustment. Otherwise, remove all packing, (and lantern) and repack.

EXCESSIVE TIGHTENING OF GLAND—Causes flow of packing lubricant, and dissipates the vehicle which holds leakage to a minimum. Use spring-loaded S/B, either a spring lantern or a spring between gland and adjustment nuts.

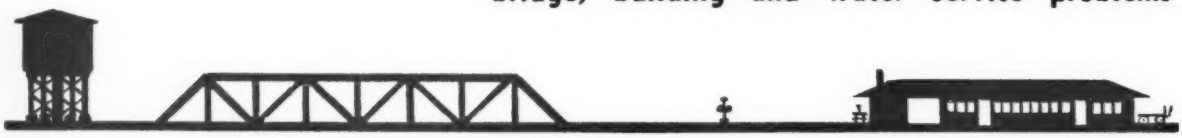
IMPROPER PACKING—No packing frictioned with rubber should be used in a centrifugal pump.

UNBALANCED IMPELLOR OR DEFLECTING SHAFT—Not running concentric with S/B. Use lead separator washers between each ring of packing. These washers should be 1/16 in. to ⅛ in. thick, depending on shaft size, and should be cut with an inside diameter slightly larger than the shaft and outside diameter slightly less than the S/B diameter. This will confine the lubricant and allow each ring to act independently on the shaft instead of moving an entire mass of stuffing.

EXCESSIVE CLEARANCE—Between shaft and gland or between shaft and pump body in bottom of S/B, as a result of corrosion or turned-down shafts. Bush the gland and S/B bottom or use "bull rings".

WHAT'S THE ANSWER?

An open forum for maintenance men on track, bridge, building and water service problems



Placing Tie Plates Under New Rail

In renewing rail on new, double-shoulder tie plates, should the plates be applied before or after the rail is set in place? What are the relative advantages and disadvantages of each method? Explain.

Set Rail in Place First

By R. L. Fox
Division Engineer, Southern
Alexandria, Va.

On my division we started the laying of 131-lb. rail in 1941, later changing to the 132-lb. section. At first we used 12-in. double-shoulder tie plates, but later changed to 13-in. and 14¾-in. double-shoulder plates, using the larger of these plates on curves of two degrees or more, through passenger landings, across bridges and through road crossings. In that year we laid rail in a total of 316 mi. of main track. In laying that rail we were replacing 100-lb. and 130-lb. rail that had been laid during the late 'twenties and early 'thirties with 10-in. and 11-in. single-shoulder tie plates.

Prior to laying the heavier rail, a thorough study was made with the object of forming a modern, efficient rail-laying gang. From this study a 126-man gang was organized, placed in charge of a supervisor, and equipped with the best of rail-laying machinery. Basically, this gang was composed of three extra gangs, each comprising an assistant foreman in charge of 30 laborers, and enough machine operators and helpers to operate the equipment.

When this gang was first organized, it laid from 360 to 420 rails each day, including turnouts. As the work progressed, this force was reduced to a total of 96 men, and production was increased until it ranged between 460 to 520 rails each day, or an average of 485 rails per day.

At first we were cribbing between the ties under the rail, were using adzing machines to obtain a uniform seat for the new tie plates, were applying creosote oil to the adzed surfaces, and were placing the tie plates and then applying the rail on the plates. We experienced all kinds of trouble with this method. We found it almost impossible to seat the new rail. Instead the rail invariably rested on the shoulders of some of the tie plates, making it difficult to operate the rail-laying machine and in some instances derailing the machine. We also found we were not getting uniform gage because the gaging force adjusted only the tie plates on the ties to which they were gage spiking the rail and in so doing were leaving some of the shoulders under the rail. This resulted in irregular gage after the rail had become seated on all the tie plates. In most instances every tie plate had to be adjusted on the tie so it would be properly placed. This required additional labor and, unless closely supervised, the spiking gangs would spike the plates before they had been adjusted.

Because of these difficulties our method of applying the plates was quickly changed. Instead of setting the rail on new plates previously placed on adzed ties, we began to set the rails first, fastening them together with the joint bars, and then placing the tie plates under the rail. To do this the rail was raised by means of two bar lifts, each of which was made from a track-lining bar by bending the points upward 1½ in. and welding a cross piece to the bar 14 in. from the point. This cross piece was made long enough to rest on two tie ends so as to place the bar between the ties out of the way of the application of the tie plates.

Two laborers, each with this type of bar, placed the points under the base of the rail and the cross pieces on adjacent ties, then

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Answers to the following questions are solicited from readers. They should be addressed to the What's the Answer editor, *Railway Engineering and Maintenance*, 79 W. Monroe St., Chicago 3, and reach him at least 30 days in advance of the issue in which they are to appear. An honorarium will be given for each published answer on the basis of its substance and length. Answers will appear with or without the name and title of the author, as may be requested. The editor will also welcome any questions which you may wish to have discussed.

To Be Answered In The February Issue

1. What types of gasoline are best suited for use with work equipment? Explain. Should high-octane or low-octane fuels be used, or can they be used interchangeably? Why? How can it be assured that the correct "gas" is regularly obtained from dealers?

2. To what extent can metallic floor hardeners be used with air-entrained concrete? Explain.

3. How often should main tracks be patrolled? By whom should the patrolling be done? How?

4. What are the best methods of predetermining the required length of concrete piles so as to reduce or eliminate the need for cutoffs? Explain.

5. How and when should tie pads be installed? Out of face at the time rail is laid? On new ties as they are spotted in? Or under other conditions?

6. Can expendable types of filter cartridges used at Diesel fuel stations be reclaimed economically? If so, how? When? Explain.

pushed on the upper ends to raise the rail high enough to allow four other laborers to insert the tie plates. This method not only required considerably less labor but the plates were placed under the rail correctly. This method also eliminated all need for adjusting the plates either by the gagers or by the spike setters when they were using the spike-driving machines. At considerably less expense this method produced a more uniform tie plate application than ever before attained. By combining this manner of applying tie plates with the use of a base gage, we solved our gaging problems and obtained a uniformly gaged track.

Don't Place Rail First

By JOHN C. ROUSE
General Track Foreman, Southern Pacific, Wells, Nev.

Double-shoulder tie plates should be placed ahead of the laying of the rail. A smaller number of men, without rail to interfere with their work, can place the plates on the ties easier than any other way and fast enough to keep up with the adzing machines. Working between the adzers and the rail-laying crane instills in them a certain incentive to keep up with the equipment ahead of them. After one laborer with a gage and bar follows the power wrench and moves the rail into correct position, men with spike mauls drive the plates into position under the rail—usually two men for each group of gagers following immediately behind the plate setters.

If the plates were to be placed after the rails were laid, probably four times as many men would be required for this operation. If the ties were cut very much by the adzers, the rail would have to be raised considerably to facilitate getting the plates under the rail. The men would no doubt have to squat down on the ties, kneel or sit on the rail. Getting up or down like that takes the life out of a man quicker than any other work. Furthermore, since all the machinery would be up in front, there would be little incentive for the men to keep up a fair rate of progress and hence they would develop a "take-it-easy" attitude.

The greatest disadvantage in placing the plates after the rail is laid is that the work would be spread over too much territory and when working under traffic it would take too long, after the head end "broke in", for the rear end to close up for traffic.

Plating Under Rail Unsafe

By N. F. ALBERTS
General Foreman, Chicago, Milwaukee, St. Paul & Pacific, Chicago

My experience with double-shoulder tie plates in connection with rail laying dates back 22 years. Having successfully handled double-shoulder tie plates by first applying the plates and then setting in the rail all these years, I could not possibly think of going back to the method of first setting the rail in place and then applying the tie plates. This method would certainly involve additional labor, for the simple reason that, after the rail has been set in place, it would be necessary to have enough men follow the rail-laying machine to lift the rail, either by means of bars or some mechanical device, in order to insert the tie plates.

An element of danger is also present if this method were used. A slight misunderstanding between the men lifting the rail and those inserting the tie plates would be enough to cause serious injury to the men handling the plates.

Regardless of what kind of mechanical device might be used to lift the rail it would involve from four to six additional laborers and some supervision. It would also bring about a slight disruption in the organization of the rail-laying gang. The gap between the rail-laying machine and the spiking unit would be greater than when plates are laid on the adzed ties before the rail is set in place. If the work is done on a busy line where the work period between trains is short, either the production of the gang would decrease or trains would be delayed.

The laying of double-shoulder tie plates on the adzed ties before the rail is set in place has worked out effectively on most railroads. In a well-organized gang it requires only one or two men with spike mauls following the rail crane to square up slewed plates.

Particular attention is given to the handling of the tie plates as they are being laid on the ties ahead of the rail-laying operation. The operation of squaring up the few plates behind the rail-laying machine is rather small and can be done rapidly, and even under the worst conditions, seldom requires more than two men to do the work.

Where the surface of the track is not in the best condition, some ties will hang after the rail is laid. These are nipped up as they are spiked. If this is not done there is a tendency for the plates to slew under the rail. Any hanging ties should be chalk marked by the foreman or his assistant so that the "sniping" gang that usually follows the rail-laying gang can tamp the marked ties.

The disadvantages in applying double-shoulder tie plates after the rail has been set in place include: (1) Additional labor required, even though some mechanical device is employed to lift the rail; (2) a greater distance or gap would be required between rail-laying machine and spiking unit; (3) the possibility of some laborer getting his fingers pinched while handling the tie plates when the rail is being raised; and (4) a slight disruption of the gang organization and decreased production.

Place Plates Before Rail

By C. HALVERSON
General Roadmaster, Great Northern, Willmar, Minn.

When renewing rail on new double-shoulder tie plates, the plates should be applied before the rail is set into plate. There is available a tie-plate spacer which quickly locates double-shoulder tie plates at the correct distance from the opposite rail. After the tie plates are set onto the ties, the tie plate spacer is moved into position by one man who walks in the center of the track and pushes the machine along. A second man walks along the side of the track where rail is being laid and, using a special tool, moves the tie plates against the gage bar of the machine in true alinement with the ball of the rail. A very simple adjustment is provided to allow for any changes in the size of the tie plates or rail. The machine only weighs 112 lb. and can easily be set on or off the track by one man. This method lessens the danger of injuries, expedites the relaying work, and holds to a minimum the

man-hours required for placing the tie plates.

Placing tie plates after the rail has been set into place would necessitate the lifting of the rail, to permit the placing of the tie plates. This operation would seem to require a greater number of men with a consequent increase in cost.

Uses for Water-Repellent Preservatives

What are water-repellent wood preservatives? Under what circumstances is their use indicated in railway buildings? What are their advantages for such use? Explain.

Have Many Uses

By F. L. Browne

Chemist, U. S. Department of Agriculture, Forest Service, Forest Products Laboratory, Madison, Wis.

"Water-repellent" preservatives for wood is a common term used to describe certain products that are sold under various trade names. In general they consist of solutions of chlorinated phenols such as pentachlorophenol or other suitable toxicants in mineral spirits or a similar hydrocarbon solvent, to which has been added a small amount of paraffin or similar wax to provide water repellency, and a somewhat larger amount of resin to keep the wax from interfering with subsequent painting of the treated wood. Wood is treated with a water-repellent preservative to give it moderate preservation against the fungi of bluestain and decay and moderate protection against rapid change in moisture content in a single treatment that is rapid, inexpensive, and applicable without elaborate equipment. The preferred method of treatment is by dipping, which requires dip tanks, but other methods also are used, such as brushing, spraying, or mopping.

Wood treated by such superficial methods takes up only limited amounts of the preservative, which penetrates only a short distance into the wood. In the end-grain of pine sapwood, which is relatively easy to treat, as much as two or three inches penetration may be obtained, but the heartwood is seldom penetrated as much as ¼ in. and the side grain as much as 1/16 in.

With such limited penetration and absorption the superficial treatments cannot give wood the degree of protection or preservation obtainable by slower, more costly, but more thorough methods. The water-repellent preservatives, therefore, do not compete with the long-established methods of wood preservation or with the more effective procedures for stabilizing the dimensions of wood. For severe conditions of service the more thorough methods remain more economical in the long run despite greater initial cost and inconvenience.

The newer products find their proper use where the conditions of service are not severe enough or the chances of adverse conditions are not great enough to justify the more thorough methods of treatment. A vast amount of wood falls in this category. In the past it has commonly gone untreated. Too often it has given poor service or has had to be repaired or replaced when a moderate degree of treatment would have kept it in satisfactory condition. The availability of the water-repellent preservatives makes neglect of such treatment less easily excusable in the future.

No one would think of recommending a water-repellent preservative for treating railway crossties, telegraph poles, or other wood in direct contact with the ground. Much more thorough preservative treatment is needed for wood that is exposed to dampness for long periods of time. But use of water-repellent preservatives should be considered for woodwork above ground where there is repeated exposure to dampness for no more than a few days at a time with opportunity between times for drying out again, and where experience shows that there is some hazard of bluestain and decay but not enough hazard to justify the expense of more thorough preservative treatment. For example, window sash have been treated with water-repellent preservatives for many years past with the result that there are now noticeably fewer complaints about mildew and decay in them. Exterior doors, fence palings, fence posts when erected on wood platforms but not when set in the ground or in concrete, wood steps, wood platforms, and wood framework exposed to the weather are suitable items for treatment with water-repellent preservatives if still more thorough preservative treatment is not considered worthwhile.

Wood for which treatment with water-repellent preservatives is appropriate is likely to be wood that is kept well painted. For that reason satisfactory water-repellent preservatives must not interfere seriously with painting. They may retard the drying of paints slightly but if at least a few days are allowed after treatment for the solvents to evaporate, the normal schedule of painting with exterior maintenance paints can be followed and there will be no adverse effect on the performance or durability of the paint. On the other hand, treatment with water-repellent preservative cannot be regarded as a substitute for the normal priming coat of paint. Treated wood requires just as many paint coats as untreated wood for good paint service.

Early paint failures by blistering and peeling may often serve as a guide to woodwork that might profitably be treated with water-repellent preservatives in future construction of similar design. Such early paint failure often comes from the wood becoming wet under the paint. If the moisture comes from the outside by penetration of rain through joints, the moisture is readily taken up by the concealed part of the wood, especially at end-grain surfaces, which are not normally painted. Such moisture may be retained a long time because its escape, which must take place chiefly through the exposed surfaces, is greatly retarded by the paint. Not only may the paint suffer damage but bluestain and decay may develop in the wood. Treatment with water-repellent preservative before erection affords at least moderate resistance to the absorption of moisture through the concealed and unpainted surfaces, and also provides resistance to fungi if the wood does become damp.

The shallow penetration obtainable by superficial application makes it necessary to do all or practically all of the surfacing, cutting, and fitting of the wood before it is treated. This is practicable because the water-repellent preservatives do not swell wood or

distort its dimensions. If some cutting must be done after treatment, as in fitting windows or doors, the cut surfaces should be retreated before the parts are fastened in place. Items such as windows may be assembled before they are treated by dipping because the water-repellent preservatives have the property of being able to penetrate into even well-fitted joints.

High-Strength Bolts for Steel Bridges

To what extent is it desirable to use bolts in place of rivets in steel bridges? Why? Is the use of bolts and rivets in combination indicated in some cases? If so, where? Explain.

Bolts Have Economical Uses

By E. J. Ruble

Structural Engineer, Engineering Division, Association of American Railroads, Central Research Laboratory, Chicago

The investigations conducted by various laboratories within recent years to determine the static and fatigue strengths of riveted joints connecting steel plates have clearly shown that the rivets, both hot and cold driven, do not completely fill the holes in these plates. It is generally agreed that the load, in most cases, is transferred from one plate to the other by friction between the plates resulting from the clamping action of the rivet heads. The magnitude of the clamping force exerted by the heads of various length rivets have indicated that hot-driven button-head rivets have an initial tension equal to at least 70 per cent of the yield-point strength of the rod from which the rivets were made and that the initial tension or clamping force increases slightly with an increase in the grip of the rivet. The fact that the load-carrying capacity of a structural joint depends upon the magnitude of the friction between the plates resulting from the clamping force of the rivet heads, and not upon the degree of filling the holes by the shank of the rivet, indicated that a structural fastener, such as a high-strength bolt, capable of exerting high clamping force would be superior to a rivet.

To determine the relative effects of various fasteners on the fatigue strength of structural joints, a total of 24 joints was recently fabricated and tested in the laboratory under a complete reversal of load. The joints used in these tests were fabricated using three types of fasteners consisting of ¾-in. round hot-driven rivets, ¾-in. round cold-driven rivets and ¾-in. round high-strength bolts. Each specimen was placed in the fatigue-testing machine and subjected to complete reversal of load until failure occurred. In general, the results of these tests indicated that the structural joints fabricated with high-strength bolts were about 15 per cent stronger than those fabricated with cold-driven rivets and about 10 per cent stronger than those fabricated with hot-driven rivets. The test indicated that in the riveted joints failure can be expected through one of the rivet holes. However, in the bolted joints most of the failures occurred through the cross section of the member indicating that the high clamping action of the bolts overcame the stress-raising effects of the holes.

It was realized that before the use of high-strength bolts in place of rivets could be considered satisfactory it would be necessary to determine if the bolts would stay tight in bridges under normal operating conditions where the members are subjected to considerable vibration. Accordingly, the research staff of the A.A.R. arranged with several of the railroads to replace rivets with high-strength bolts at particular joints where trouble had been encountered in keeping rivets tight. Over 1,000 bolts of various sizes and lengths were used in about 20 different types of joints on 12 bridges. In some of these joints the rivets had been working loose after several months operation thus necessitating the re-driving of the rivets every year at considerable expense to the railroad. High-strength bolts were used to connect diaphragm plates to stiffener angles in a new beam span and in repairing the floorbeam hangers of a pin-connected truss span.

The test installations of the high-strength bolts have now been in service for about two years, permitting the following observations to be made: (1) A visual inspection of all the bolts has failed to reveal any evidence of cracked paint, rust or slippage of the members; and (2) a check on the tightness of a representative number of bolts reveals that the majority of the bolts have retained their original clamping forces. Some of the bolts appear to have lost a small amount of clamping force, but it is not known whether the bolts were not properly tightened when installed or whether the bolted members are re-seating themselves due to the high clamping force.

The use of high-strength bolts in place of rivets for all field connections of railroad bridges has important economic possibilities. The bolting of a joint is more economical than riveting, especially in field construction and more particularly in some remote structures where the necessary riveting equipment is not readily available. Further, it obviously would be more economical to use high-strength bolts as erection or fitting-up bolts and leave them in place during the field erections of new structures, rather than incurring the expense of their removal and replacement with rivets. Recent figures indicate that about 800,000 field rivets are re-driven each year by maintenance crews during the repair of railroad bridges in the United States, and about 1,400,000 field rivets are driven during the erection of new structures. It is estimated that approximately $160,000 per year can be saved by the railroad industry by the use of high-strength bolts in place of rivets in maintenance work alone with a total saving of $440,000 per year if bolting were used for all field connections.

In general, it is not good practice to use two different types of fasteners in any one joint. However, in several of the field installations of the bolts, only those rivets that were loose were removed and replaced with high-strength bolts. These joints are now functioning properly and there was no indication that the remaining rivets in the joints were loosened by the additional force of the bolts.

In conclusion, it appears from the results of the laboratory and field tests that high-strength bolts have a definite use in maintenance work on railway bridges, as well as in the erection of new structures, especially smaller bridges in remote locations.

Water for Car-Washing Facilities

To what extent is the water-service department involved in the design, operation and maintenance of car and locomotive washing facilities?

A Water-Service Problem

By W. D. Gibson
Water Service Engineer, Chicago, Burlington & Quincy, Chicago

The water service department is or should be involved in the design, operation, and maintenance of car and locomotive washing facilities for several reasons. Primarily, an adequate water supply is essential to either facility, particularly car washers. Comparatively large quantities of water are needed to clean and rinse the cars properly. Also, this water is needed at pressures through the spray nozzles that will be effective in removing the detergents and the dirt loosened by them.

These circumstances dictate that qualified personnel of the water-service department design the layout for adequate size of pipe lines, for pumping equipment and for drainage conditions. The operation of car washers over a period of years has indicated the necessity for the use of piping that will resist the chemical action of most of the detergents on the market. This is true not only of the piping used to convey the detergent, but also the other pipes conveying air and water, since these are often exposed externally to corrosive conditions. The water-service department, which is generally responsible for the maintenance of such piping, should be involved in the design to the extent that the most suitable materials are used and that the piping is readily accessible for inspection and repairs.

At the present time, most locomotive washing facilities consist of a system whereby an engine-washing oil, having a petroleum base, is mixed with hot water and steam and this mixture is sprayed on the locomotives. Considerable piping for water, steam and oil is required in such an installation and the water-service departments should be in the best position to design it.

Another item concerning locomotive washers that has become increasingly important in recent years is that concerning the disposal of the drainage from the wash tables. This drainage generally carries large quantities of the washing oil as well as lubricating oil and grease knocked off the locomotives in the cleaning operation. The establishment of sewage disposal systems at a great many places and increased activity by various agencies to prevent stream pollution have resulted in railroads being prohibited from disposing of wastes containing oil or other obnoxious matter into sewers or streams.

Water-service departments need to consider such conditions with the purpose of separating the oil and other matter so that they may be disposed of in an acceptable manner.

Tearing Down Retired Buildings

What are the advantages and disadvantages of tearing down retired buildings with company forces rather than under contract? When railroads do their own work, what use is made of the salvaged materials? Explain.

Better to Use Own Forces

By W. A. Huckstep
General Supervisor of Buildings, Missouri Pacific, St. Louis, Mo.

It has been the practice in the past on some railroads to dispose of retired and abandoned buildings by either selling them at a nominal price, or giving them to outside concerns or to individuals under an agreement whereby the procuror dismantled the building, removed all material from the site, filled any excavations and left the site clean.

During the late world war, material being difficult to obtain, particularly lumber, and prices having increased so greatly, it was and still is found to be profitable to dismantle most buildings with company forces and recover all usable material. In many cases well-seasoned lumber of better quality than is presently obtainable can be recovered. Cast-iron soil and vent pipes and their fittings, scarce and expensive items, can frequently be recovered. Old brick buildings will often be found to have been laid up in lime mortar and the brick can readily be cleaned and reused for backing up purposes in new brick buildings.

In addition to using reclaimed lumber for routine repairs and in new building construction to the extent possible on the division where recovered, the excess can be sent to some central store point on the railroad where, at a nominal cost, provision can be made for cutting and resawing it to meet the lumber requirements of many special uses such as formwork, and as blocking or bracing for freight lading at major freight stations. Old car siding from car-repair and car-building shops, which it may be the practice to dispose of locally at a nominal price, is another source of secondhand lumber particularly suitable for the above purposes.

In actual practice such reclaiming of lumber and other materials has proven quite profitable, as well as conserving large quantities of scarce material. In additional to lumber, cast-iron pipe, and brick, there are other miscellaneous items of material, suitable for reuse, that can frequently be recovered. One of the most valuable of these is the scrap metal that can be salvaged from abandoned shop structures.

Except for badly deteriorated buildings, those of the type having no salvable material and small isolated buildings, it should be profitable to any railroad to use company forces to dismantle all buildings and reclaim the salvage.

Better to Issue Contracts

By M. J. Hubbard
General Supervisor Bridges and Buildings, Chesapeake & Ohio, Richmond, Va.

We have found that the type, location and condition of the building to be retired are the governing factors in deciding whether salvage work should be done by contract or by company forces. With a few exceptions it is much more economical to retire buildings by contract.

The greater portion of buildings that are retired by railroads have

considerable age and at the present cost of railway labor the value of material salvaged does not offset the cost of tearing them down. If the structure is fairly new and of heavy construction with a considerable amount of heavy salvageable material, I would recommend removal by company forces. In some cases access to the structure can only be made by rail and as a consequence these jobs are done by company forces.

The most economical retirements have been made by contracting to sell the structure in place for a fixed sum or by paying a fixed sum to clear the building from its site within a specified time. This method is economical because contractors usually have a specific use or sale for the salvaged material, as well as equipment needed to tear buildings down.

Lumber salvaged from buildings should be used immediately in another building or kept dry, because old lumber will not stand very much exposure to the weather in a pile or stack. This is another reason why railroads cannot realize very much from salvage, for new buildings are generally at new locations, and the old one cannot be removed until the new structure is erected. This causes the salvaged material to be surplus.

The costs of handling and removing nails from the old lumber will as a rule make salvaging by company forces uneconomical unless the lumber can be definitely and immediately used on another job.

Salvage Standard Buildings

By George S. Crites
Division Engineer (Retired), Baltimore & Ohio, Baltimore, Md.

At present labor rates, it does not pay a railroad to salvage materials from any retired buildings with their own forces. In outlying districts, it is best to get bids from adjoining interests for them to dispose of the building and leave the site in a presentable condition. Farmers or contractors often give much more for some old building than the materials alone would be worth to the railroad even if the cost of recovering them were not included.

However, there may be circumstances under which it is economical for a railroad to recover materials from retired buildings with its own forces. This would apply more particularly to buildings that had been standardized in all respects so that the materials from one can be used in the repair or construction of others.

This would apply generally to shelter sheds, tool houses, small office buildings, etc., and in some instances to combination stations, water tanks, water tubs, and platforms, the materials for which can not now be purchased for less than two or three times the amount they originally cost.

There may be rare cases where large, well-seasoned timbers from posts, beams, etc., can be recovered and milled into sizes that fit every-day needs, but that is the exception rather than the rule. Generally, it does not pay to attempt to use the lumber salvaged from old retired buildings.

Off-Track Equipment for Snow Removal

What types of off-track work equipment are effective in opening snow-filled cuts? What procedures in using such equipment for this purpose give the best results?

Performance Not Known

By J. W. Risk
Superintendent of Work Equipment, Canadian National, Toronto, Ont.

This question is one that is worthy of careful consideration as it tends to suggest a review as well as to stimulate interest in improving established methods.

However, we have made little use of off-track equipment to clear snow from railway cuts. Our experience would indicate that conditions usually encountered are such that the removal of snow from cuts can be done most satisfactorily with the operation of a wedge or rotary plow. A spreader is used when necessary to widen the 16-ft. opening made by the plow. On occasion, when the accumulation of snow in a cut is of such extent, locomotive cranes, with large-capacity snow-handling buckets, have been used to remove snow that cannot be taken care of with a plow or spreader. Crawler cranes, equipped with large-capacity snow-handling buckets, have been used in place of locomotive cranes where the terrain is suitable.

Bulldozers Are Effective

By Division Engineer
Northern Road

Perhaps the most effective piece of off-track equipment for opening snow-filled cuts is the bulldozer. There appears to be no other piece of equipment which can clear a cut or slide in as short a time as a bulldozer.

Although a machine similar to a D-8 tractor is to be preferred, it has been found that a dozer of the D-7 size is the better all-around machine since it can be used for moving large quantities of materials in the summer season and snow in winter, yet it is versatile enough to operate efficiently in such confined spaces as are often encountered in railway work. Where there is plenty of "elbow room" a larger machine is superior.

In removing snow from cuts, if there are sufficient machines available, one bulldozer can move ahead clearing the track while one or two can follow behind widening the cut. The ability of a bulldozer to move the snow any desired distance from the track is one of its greatest assets. Wedge plows, when bucking a deep cut, can only throw the snow a very short distance and in the case of slides in mountainous territories where it is not possible to charge the snow they can only squeeze it back from the track. Rotaries, whether in cuts or slides, can only cut a trench and if there is any wind blowing this soon fills in. The bulldozer, on the other hand, can push the snow back as far as required and lessen the possibility of the cut refilling with snow.

Both on prairies and in mountains, the bulldozer has demonstrated its ability to move large quantities of snow very effectively. These same machines may also be used to prevent cuts from filling in or in lessening the amount of snow in a cut by working during the summer months in widening the cut and in the winter by plowing windrows of snow at a sufficient distance back from the track

to trap the blowing snow. Under favorable conditions this windrow will last through about five storms before its effectiveness is lost.

Bulldozers when used in conjunction with on-track snow-fighting equipment can materially shorten the time required to open a line. By actual practice it has been found to be a very effective machine with which to clear large quantities of snow in the least possible time.

First Open Line with Plows

By F. H. McKENNEY

District Engineer M/W, Chicago, Burlington & Quincy, Omaha, Neb.

On-track equipment is the most efficient for opening up a line in a snow storm. The wedge plows are used until the drifts become too deep and there is no place to throw the snow. It then becomes necessary to bring in the rotary plow to cut through the drifts and throw the snow away from the tracks. This leaves vertical walls of snow wide enough for train operation, but if these are very high it is desirable to widen the cut with off-track equipment.

Only limited use has been made on our line of off-track equipment for opening snow-filled cuts. The fact that it must be transported to the job, and is relatively slow in operation, limits its use largely to cleanup operations such as widening snow cuts after the line has been opened. In a few cases in which highways were open along the line and bulldozers were available, they have been used to open individual cuts. Only the larger machines proved efficient in this work, and then conditions had to be such that there was some place to push the snow. Long narrow cuts were not opened with off-track equipment. However, in one operation where the drift had become so solid from a mixture of sand and ice that it gave the rotary plow a lot of trouble, a bulldozer was used to break the drift down in front of the plow to loosen the snow and speed up the operation.

Large bulldozers and crawler cranes were the only off-track equipment put to these uses. The cranes were brought in after the line was open and were used on some cuts to slope the overhanging drifts left by the rotary plows. Either dragline or clamshell buckets were used to lift snow out of the cut so the bulldozers could shove it away. This was slow and expensive, but it was effective. Bulldozers of all sizes were effective around stations to clear snow away from switches, driveways, platforms etc., as well as other off-track equipment but, for opening cuts out on the line, the problem of getting the machines to the job usually eliminated off-track equipment for opening the line.

Height of Raise with On-Track Tampers

What is the maximum, minimum, and ideal amounts that track should be raised to permit its being effectively and economically tamped with on-track tampers? What factors govern the height of raise? Explain.

Maximum Is Seven Inches

By J. R. KANAN

Assistant Engineer of Track, Colorado & Southern, Denver, Colo.

My experience in surfacing track with crushed stone ballast, graduated in size to a maximum of 1½ in., has covered maximum raises of 7 in., and minimum raises of 2 in. with the ideal being 5 in. This ideal raise permits a more even and effective tamping with power tampers.

The factors governing the height of raise consist of the condition of the ballast in the track and tonnage and speed of trains handled over the track. Where ballast is badly fouled and where the type of ballast is changed, it is very important that not less than 5 in. of new ballast be placed under the ties, after the old ballast has been removed. The old ballast should be removed by skeletonizing. If less than this amount is placed, the old material will work up into the new and this, with lading dropping from cars and the earth from the adjoining fields blowing onto the track, will cause it to become fouled sooner than if a raise of at least 5 in. had been made. In handling reballasting operations on our line, as stated above, we have used power tampers exclusively and have been able to decrease by 75 per cent the follow-up spot tamping.

Although five inches is considered as our ideal raise, in some cases where the ballast is not fouled and it is desirable to improve the riding of the track, we raise the track 2½ inches and tamp with power tampers. The use of machines has reduced the cost of spotting work behind raises of this height 75 per cent.

In preparing track to change the type of ballast, we make a skeleton raise of 2½ in. during which operation we renew and space the ties. This work is handled by hand-powered tampers. This method, by which we can raise ¼ mile per day with a 30-man gang has proven to be very satisfactory as well as economical.

In some places we are replacing gravel ballast with volcanic ash. When doing this, we give the track two raises—the first being 5 in. and the second from 2½ in. to 3 in.—whichever is required to obtain a minimum of 7 in. of volcanic ash under the ties. We make the second raise after a period of 7 or 8 months, during which the track has time to settle on this light ballast which weighs only 1200 lb. per yard. All such raises are made with power tampers with very effective and satisfactory results.

Depends on Many Conditions

By W. E. CORNELL

Engineer of Track, Nickel Plate, Cleveland, Ohio

This question is rather broad and perhaps does not lend itself to a simple unqualified answer covering the many conditions of ballast, track structure and tonnage carried. It is my opinion that where ballast is workable under the ties, small lifts of 1 in. to 2 in. might be made satisfactorily, but where the original ballast is fouled and thoroughly compacted to the level of and particularly under the bottoms of the ties, such as is found in heavy-traffic lines after a few

years, the minimum lift must be at least 3½ in. to 4 in. for any of the ontrack tampers now on the market with positioned tamping bars, blades or shoes, where the upward pressure is at least partially obtained by heaving the ballast under the ties.

The economical height in most cases would be the minimum height which could be effectively tamped. The maximum height of raise depends to a large degree on the tamping principle used. I would define these methods or principles under two and possibly three classifications: (1) As pressure resulting from hammer blows; (2) as light pressure and vibration; and possibly (3) as a combination of heavy pressure and vibration. The maximum amount track can be raised and effectively tamped by each of these methods is determined largely from experience with each.

Make Big Raise in Two Bites

By CHARLES MILLER
Assistant Roadmaster, Western Pacific, Elko, Nev.

The main factors determining the amount of raise to be given any piece of track are many and varied. They include the type and size of ballast used, the type of tampers, whether the track has been skeletonized or a patch-ballast job is contemplated on the old rock, and the character of the program desired. For maximum effectiveness and economy it is my belief that track should be raised between 3 and 4 in., with 2½ in. being the minimum and 5 in. the maximum raises allowable.

Effectively-tamped track must have the ballast firmly and uniformly tamped beneath each and every tie. To be economical such tamping must be accomplished with a minimum of time and effort. To expedite the movement of the tampers, whether on-track or off-track, the ties must be raised enough to give the tamping blades easy access to the space beneath them and to allow the ballast to freely enter the cavity where it is to be firmly packed. Any raise of less than 2½ in. will not facilitate this, especially in patch-ballast work where the old rock is to be used without benefit of skeletonization. Any effort needlessly expended in opening up the cribs ahead of the tampers adds to the cost of the job, since the men doing so could have been put to better use elsewhere. This difficulty in penetrating the ballast will also detract from the effectiveness of the job because there will inevitably be ties inadequately tamped. This, of course, is more to be expected in the case of individual hand tamping machines than with the newer multi-tamper machines, and more so in old ballast than new.

If any raise in excess of 4 in. is made, we encounter the problem of attempting firmly to pack a greater amount of loose material than I believe can be handled without an intermediate settlement period. To do so adequately would take more time than can be allowed, and even then there seems to be a point after which the tamping blades will not pack the material, but tend to cut through it, churning, but not packing it. A lift of more than 4 in. will often require the use of additional fork men to feed ballast to the tampers—another added cost.

No track-raising job can be considered at its best until it has been subjected to several months of traffic tamping. Regardless of the effectiveness of the tampers there will always be some settlement, and the uniformity depends directly on how well the machines were supervised and the amount of loose, fresh rock which must be compacted. When any raise of more than 4 in. has been made, the effectiveness of the job is decreased proportionately, since the chances for a uniform settlement lessen as the amount of loose ballast beneath the ties is increased. The cost of "spotting" such track later adds much to the cost of the ballast program. At times this work is of such a nature as to require the use of an extra gang rather than regular section forces. Thus, in my opinion, both the effectiveness and the economy of a tamping job is decreased if the raise to be made is less than 3 or more than 4 in., the latter being what I would consider as ideal. If a raise of more than 4 in. must be made, I think that a preliminary raise should be given and the track allowed to settle before the machine-tamped final raise is made. If a lift of less than 3 in. is to be given, the cost of the work will be greater and this should be realized from the start, not after the work reports begin coming in.

SOMETHING NEW IN "RIBBONRAIL" LAYING—To speed up the installation of continuous welded rail in the Moffat tunnel, the Denver & Rio Grande Western developed the interesting procedure illustrated above. After a long rail has been unloaded on the ties in a position inside the tie plates, it is threaded through a roller-equipped cradle suspended from the 50-ft. boom of a 25-ton locomotive crane. Then, as the crane moves forward, the cradle rolls along the rail as it lifts the rail and thus progressively guides it into a position directly over the tie plates.

PRODUCTS OF MANUFACTURERS

New, improved equipment, materials, devices

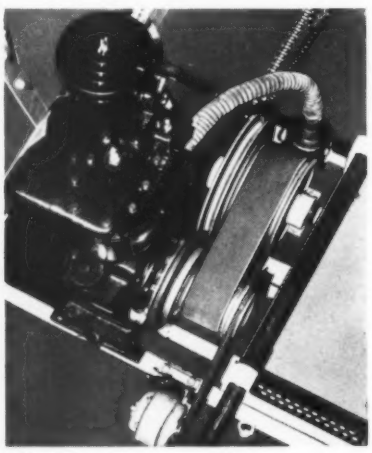
(For additional information on any of the products described in these columns, use postcards, page 1099.)

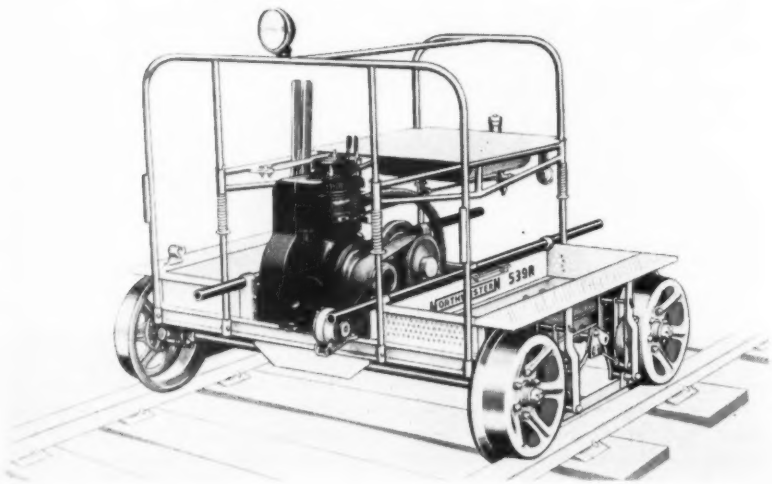
NEW SERIES OF LIGHTWEIGHT MOTOR CARS

THE Northwestern Motor Company, Eau Claire, Wis., has introduced an entirely new line of lightweight inspection and section cars, including a one or two-man inspection car (No. 539 R); a four-man inspection car (No. 532 R); and a light section car (No. 534 R). The outstanding feature of the new cars is a new type of reversing mechanism which precludes the need for mechanical clutches or transmission gearing. When the car is moving forward, power is transmitted through an endless cord belt from the engine pulley to a pulley on a countershaft and then through roller chains from the countershaft to a rear axle sprocket.

Reversing the car is accomplished by moving the countershaft pulley forward until a V groove on the side of the pulley engages a V-type friction ring on the side of the engine pulley. When these V surfaces are in contact the countershaft is friction driven in the reverse direction. The company reports that this type of drive was developed to provide a method of facilitating the reversing of the motor cars, and, at the same time, to keep the weight of the reversing mechanism to the minimum.

The seats of the new cars are spring-suspended to minimize the transmission of track shocks and engine impulses. Each of the units is powered by an 8.25-h.p. Briggs and Stratton air-cooled engine.





The new Northwestern motor cars, one of which—a light one or two-man inspection car—is shown below, feature a new type of reversing mechanism (left) which precludes the need for clutches or gears

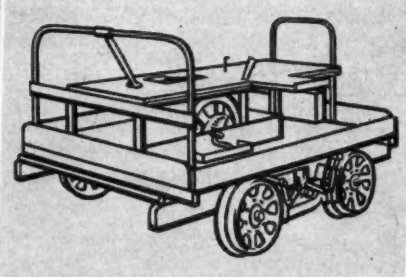
SAFETY GOGGLE

THE American Optical Company, Southbridge, Mass., has announced a metal safety goggle, called the F 4100 Ful-Vue, which incorporates a number of new design features. The eyewire of the goggle is flat instead of round, and is decorated with engraved beading. The end pieces each incorporate a friction joint with wide bearing surfaces which minimize temple drop. The screw heads are countersunk to prevent snagging.

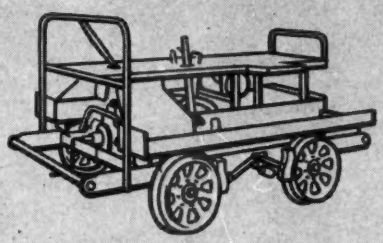
The temples of the goggles are easily adjusted and have perspiration-proof insulating tubing of an attractive brown color over the ear portions. The tubing is sealed to keep out dirt. The guard arms supporting the nose pads are longer and newly shaped for easier adjustment.

Side shields for protection against particles that strike laterally are optional. These may be obtained in either perforated wire mesh or clear acetate. The F 1400 goggle is available with 6-curve Super Armorplate clear or Calobar lenses in medium, dark or extra-dark shades. Super Armorplate lenses ground to the wearer's own prescription can be furnished if desired.

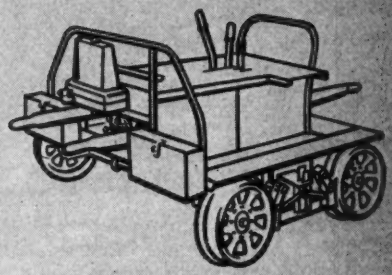
(Please turn to page 1148)



Model 44-B
Standard section car on many roads; powered to haul trailers with men, tools and/or ties.



Model 40-B
Heavy-duty section car; four speeds forward and reverse.



Model 57-D
One-man inspection car; light, fast, dependable.

The longer the ride
The better you'll like 'em...

Rail cars built the way railroad men want them . . . with ample power, more convenience and added comfort that make short rides a snap, long rides a pleasure . . . Fairbanks-Morse rail cars . . . first on the roads, *and still* first! Fairbanks, Morse & Co., Chicago 5, Ill.

When it comes to railroad equipment . . .

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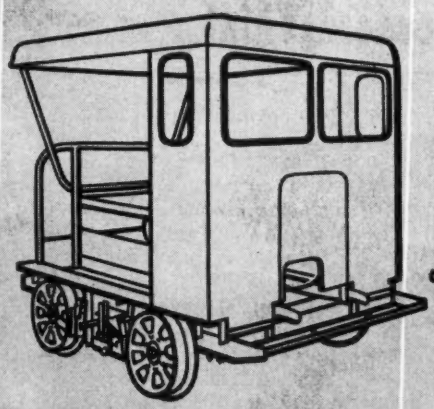
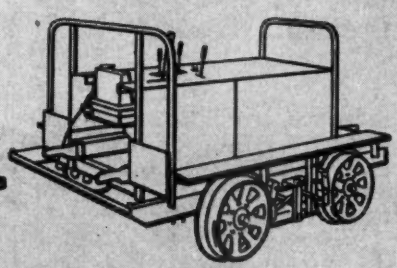
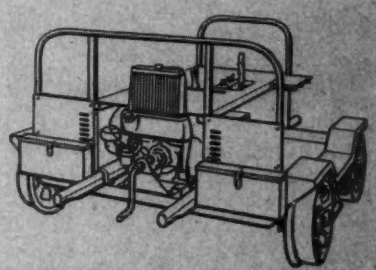


Model 53
6-to-8 man standard section car showing comfort-adding metal cab.



Model 58
Light section car; for 6 to 8 men.



Model 101
Newest inspection car with advanced safety features.

For additional information on any of the products described on this page, use postcards, page 1099.

TUNG OIL ADDED TO ZONE ROOF COATING

THE Zone Company, Forth Worth, Tex., has announced that it has improved the water-proofing qualities and increased the service life of its heavy-duty roof coating by adding tung oil to the ingredients which make up the coating. When the new formulation is applied to a roof, the tung oil is said to form a pliable skin at the surface of the roof coating which helps to keep the asphalt molecules in place and to slow down the oxidation process.

PORTABLE POWER SAW

THE Mall Tool Company, Chicago, has announced a new lightweight, heavy-duty, portable power saw, with a 3-in. capacity, for ripping, crosscutting and angle-cutting rough or finished lumber. Known as the Model 87 MallSaw, it can be furnished with either a right or left blade, as desired.

In addition to lumber cutting, the saw, equipped with suitable

attachments, may be used for grooving mortar joints; cutting plastics and metals, including steel; and cutting or scoring composition materials, tile, stone and concrete. Also available for use with the saw is a bevel-depth attachment which permits straight cutting in depths from 11/16 in. to 2 31/32 in., and bevel cutting up to 45 deg. in depths from ¾ in. to 1⅞ in.

HYDRAULIC LOADER FOR WHEEL TRACTOR

THE Oliver Corporation, Cleveland, Ohio, has introduced a new type of hydraulic loader known as the Strait-Line, for application to the Oliver Model 77 wheel tractor. With this type of loader the operator can dig either at the front or at the rear of the tractor, and still always dump at the front. Much turning of the tractor is thus eliminated, with the result that speed of operation is increased and tractor wear is reduced. Front dumping while digging at the rear is accomplished by passing the bucket over the top of the tractor.

According to the manufacturer, rear digging has several important advantages in itself. In rear digging the load adds weight to the rear wheels, increasing traction to the extent that more fully-loaded buckets can be obtained. At the same time it reduces weight on the front wheels and thus reduces the manual effort required in steering.

The bucket of the Strait-Line loader has long loading lips with sides sloping up to the bucket proper at an angle of about 30 deg. These lips are said to penetrate a bank more easily than the edge of a conventional bucket. In addition, a rear-end tilt, obtained by pushing the bottom of the bucket away from the tractor, lifts the cutting edge 20 in. and thrusts it farther into the bank after the tractor has stopped. A still further penetration into the bank is obtained when the bucket is raised to the rear carrying position.

When raised to cab-roof height at the rear, the sides of the bucket point upward and automatically stay that way as the bucket travels over the roof to the front dumping position.

What Our Readers Think

WHY NOT STORE GRAIN IN OBSOLETE BUILDINGS?

St. Louis, Mo.

TO THE EDITOR:

I WAS interested to read in the "What's the Answer" section of the June issue the suggestions for using obsolete steam locomotive shops.

None of the suggestions included that of utilizing such structures for grain storage, which is one of the prime needs of this country today. I know that in some localities obsolete shop buildings have been leased for this purpose. While it would probably not be possible to utilize such buildings except in the grain belt and adjacent areas, even that territory would cover a considerable portion of the country. In other areas obsolete shops might be used for the storage of baled hay and cotton.

If the industrial departments of the railroads are advised of the availability of these obsolete buildings, I am sure that in many instances they could obtain lessees who have a real need for such storage space.

W. A. HUCKSTEP
General Supervisor,
Bridges & Buildings
Missouri Pacific

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Control of Weeds and Brush

Fence to fence spraying was started by our company in 1948. Since that time we have developed the type of equipment best suited for rapid progress in this newer type of spraying.

The data relating to cost per mile is sure to be of interest to all maintenance engineers. We offer all such data without obligation.

Fence-to-fence spraying offers tremendous possibilities in improved control of undesirable vegetation. The savings in the cost of labor involved in mowing is impressive.

Intelligent guidance can be provided only by a company such as ours which has made this type of work their specialty for a long period of years. We have the chemists, the equipment and men trained in this highly specialized type of work. **We invite you to consult with us in working out a program for 1951.**

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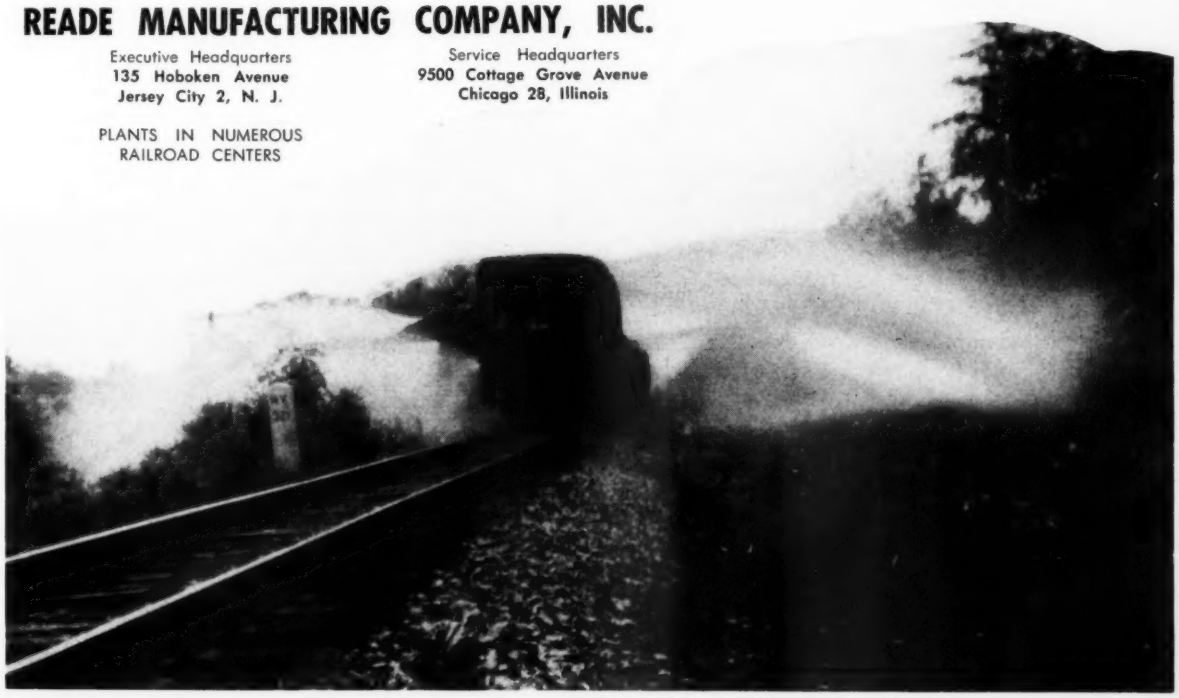
PLANTS IN NUMEROUS
RAILROAD CENTERS



THE MONTH'S NEWS

Happenings among the railways — the associations — the suppliers

Changes in Railway Personnel

Engineering

F. H. Cook, assistant engineer on the Missouri Pacific Lines in Texas and Louisiana, at Palestine, Tex., retired recently because of ill health.

W. B. Small, draftsman on the Norfolk & Western, has been appointed resident engineer, with headquarters at Roanoke, Va., succeeding **Chapman J. French,** who has retired.

William H. Hoar, division engineer on the Southern, at Hattiesburg, Miss., has been appointed engineer in charge of the construction of the road's new Ernest Norris yard and engine terminal facilities, with headquarters at Birmingham, Ala.

Robert Woodcock, assistant to the engineer maintenance of way of the Eastern region of the Pennsylvania, with headquarters at Philadelphia, Pa., has been appointed assistant engineer maintenance of way, with the same headquarters.

As a result of the abolition of the Toledo division of the Pennsylvania, as reported elsewhere in these columns, **J. E. Chubb,** acting division engineer of that division, has been appointed assistant division engineer of the Columbus division, with headquarters at Columbus, Ohio.

J. G. Fry, division engineer on the Gulf, Colorado & Santa Fe, with headquarters at Temple, Tex., has been appointed acting district engineer, Eastern district, Eastern Lines of the Atchison, Topeka & Santa Fe, with headquarters at Topeka, Kan., succeeding **H. E. Wilson,** who has been granted a leave of absence. A sketch of Mr. Fry's railroad career was published in the May issue in connection with his appointment to division engineer.

James C. DeJarnette, division engineer on the Richmond, Fredericksburg & Potomac, has been elected chief engineer, with headquarters as before at Richmond, Va., succeeding **Edgar M. Hastings,** who has retired after nearly 47 years of service with that road. Mr. DeJarnette attended the public schools of Ashland, Va., and Randolph Macon College. He entered the service of the

James C. DeJarnette

R. F. & P. 33 years ago as a rodman and was promoted successively through the positions of instrumentman, resident engineer at Fredericksburg, Va., assistant engineer—construction and maintenance, and supervisor of track. In 1943 he was appointed division engineer, the position he held until his recent advancement.

Mr. Hastings was born at Lutherville, Md., on May 5, 1882, and attended the Baltimore (Md.) public schools, Baltimore City College, Baltimore Polytechnic Institute and Virginia Military Institute (honorary alumnus). He entered railroad service with the Baltimore & Ohio in 1899 on summer work surveys,

Edgar M. Hastings

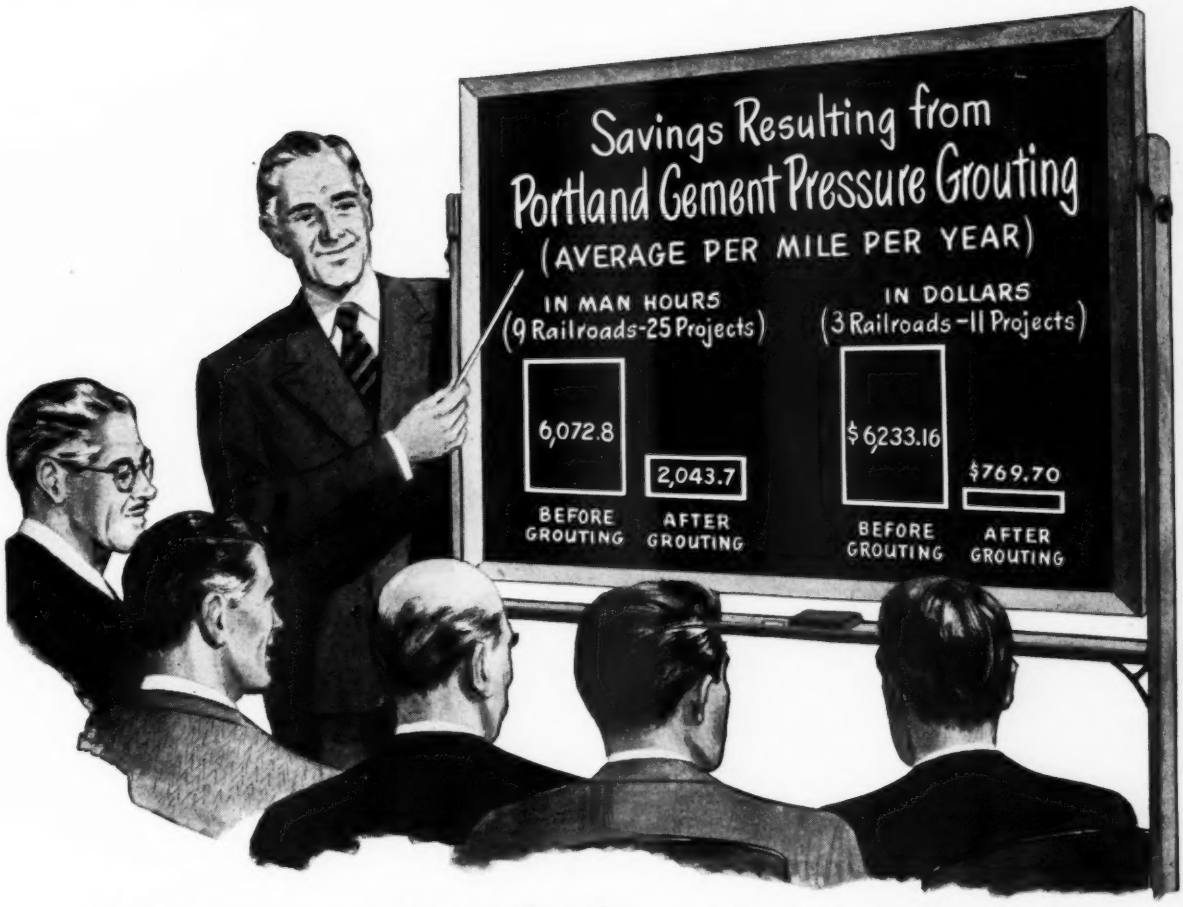
and subsequently served as rodman and instrumentman. He joined the R. F. & P. in December, 1903, and served as instrumentman and inspector on location and construction until 1906, when he was appointed resident engineer. Mr. Hastings held the latter position until 1920, when he became principal assistant engineer. In 1922 he was appointed chief engineer of the road.

C. A. Ashbaugh, assistant engineer on the Atchison, Topeka & Santa Fe, with headquarters at Galveston, Tex., has retired after nearly 47 years of service.

Clarence C. Lathey, assistant division engineer on the Syracuse division of the New York Central, with headquarters at Syracuse, N. Y., has been promoted to division engineer of the St. Lawrence, Adirondack and Ottawa divisions, with headquarters at Watertown, N. Y., succeeding **E. R. Murphy,** who has been transferred to the Electric division at New York. **J. V. Middleton,** assistant division engineer at Watertown, has replaced Mr. Lathey at Syracuse, and **W. R. Benish,** supervisor of track at Jersey Shore, Pa., has been promoted assistant division engineer to succeed Mr. Middleton at Watertown. **W. S. Ledyard,** assistant supervisor of track on Subdivision 5, Mohawk division, with headquarters at Albany, has been appointed assistant engineer in the office of the engineer maintenance of way at New York, to replace **J. C. Neff,** whose appointment as supervisor of track at Jersey Shore, Pa., is noted elsewhere in these columns.

Continuing system-wide modernization of its operations to fit present-day requirements, the Pennsylvania has made several changes in its operating department. Five grand divisions—Eastern Ohio, Western Pennsylvania, Northern, Eastern Pennsylvania and Southern—have been eliminated. The Renovo and Buffalo divisions have been combined to form the new Northern division, with headquarters at Buffalo, N. Y., and the Toledo division has been discontinued. That part of the Toledo division from Toledo Junction, Ohio, just west of Mansfield, to Toledo and Detroit, Mich., has become part of the Eastern division, with headquarters at Pittsburgh, Pa., and the Sandusky branch of the Toledo division has been consolidated with the Columbus division. The following changes in engineering personnel have

(Continued on page 1152)



Maintenance Records Show Savings Made by PRESSURE GROUTING

AN ANALYSIS of maintenance data on 36 track stabilization projects proves the tremendous money-saving possibilities of portland cement pressure grouting. These projects are located on 12 railroads and total more than 46 miles.

The railroads used two methods of measuring performance. Nine kept records of the man hours of maintenance required on 25 projects. Three kept records of maintenance labor cost on 11 projects. Records ranged from 6 months to 6 years before grouting and from 6 months to 6 years after grouting.

Where man hours was the basis, maintenance dropped from an average of 6,072.8 hours per mile per year before grouting to an average of only 2,043.7 hours per mile per year after grouting. The reduction ranged from 41% to 100% with an average saving of 66% in man hours per mile per year.

Those railroads using a cost basis found that maintenance labor costs dropped from an average of $6,233.16 per mile per year before pressure grouting to an average of only $769.70 per mile per year after pressure grouting. The reduction ranged from 27% to 100% and averaged 88%.

Besides reducing maintenance costs, portland cement pressure grouting increases rail and tie life, saves ballast, speeds traffic by lifting slow orders, allows heavier loads, insures smoother-riding track.

These advantages can be obtained economically because pressure grouting requires only a small labor force and little equipment. And its off-track operations do not delay traffic. More than 55 major railroads now operate over hundreds of miles of pressure grouted track. For more data send for free literature, distributed only in the U.S. and Canada.

PORTLAND CEMENT ASSOCIATION

DEPT. 12-27, 33 WEST GRAND AVENUE, CHICAGO 10, ILLINOIS

A national organization to improve and extend the uses of portland cement and concrete through scientific research and engineering field work

resulted from this action. **C. W. Van Nort,** engineer maintenance of way of the former Western Pennsylvania grand division, and **G. A. Williams,** engineer maintenance of way of the former Eastern Ohio grand division, have been appointed engineers maintenance of way of the Central region at Pittsburgh. **W. W. Boyer,** engineer maintenance of way of the old Northern grand division, has been appointed engineer maintenance of way of the Western region at Chicago. **F. P. Filippelli,** engineer maintenance of way of the former Eastern Pennsylvania grand division, and **P. X. Geary,** engineer maintenance of way of the former Southern grand division, has been appointed engineers maintenance of way of the Eastern region, with headquarters at Harrisburg, Pa., and Wilmington, Del., respectively.

F. W. Campbell, division engineer of the Belleville division of the Canadian National, at Belleville, Ont., has been appointed district engineer of the Montreal district, at Montreal, Que., succeeding **H. K. Morrison,** who has retired after many years of service.

R. A. Shier, division engineer of the Hornepayne division of the Canadian National, with headquarters at Hornepayne, Ont., has been transferred to the Belleville division, at Belleville, Ont., succeeding **F. W. Campbell,** whose appointment as district engineer at Montreal, Que., is noted elsewhere in these columns. **R. H. Menary,** assistant division engineer of the Belleville division, has been promoted to division engineer to succeed Mr. Shier at Hornepayne. **D. W. Blair,** division engineer of the Laurentian division with headquarters at Quebec, Que., has been transferred to Montreal, Que., and given jurisdiction over the Montreal Terminals and St. Jerome divisions, replacing **M.J.A.A. Des Trois Maisons,** who has resigned. **L. M. Poitevin,** assistant engineer of the Laurentian division, in turn, has been advanced to division engineer to succeed Mr. Blair. **B. F. Keays,** assistant division engineer of the Moncton division, with headquarters at Moncton, N. B., has been promoted to division engineer of the New Glasgow division, at New Glasgow, N. S., to replace **R. McIsaac,** who has retired. **G. H. Hoganson,** assistant engineer, at Moncton, has been promoted to succeed Mr. Keays.

gets high UTILITY and MOBILITY rating from Chicago, South Shore & South Bend

It happened all in one day. On a rail-laying job, MICHIGAN set in as many rails as the gang could lay, gage and fasten. Then it travelled five miles to unload a car of cinders.

Result? MICHIGAN'S exceptional mobility increased productive time of crane and operator . . . released a steel gondola for revenue service . . . reduced per diem payments on a foreign car!

And this is not unusual for a MICHIGAN. Its truck mobility is proved daily . . . unloading material at a storage point . . . handling wheels at the car shop . . . then dashing off to do all types of work on the 78-mile electric line with complete satisfaction!

What MICHIGAN is doing for the Chicago, South Shore & South Bend, it can do for you. And fast mobility is only one of the many "extras" you get in a MICHIGAN. There are many more! Learn why MICHIGAN gives you more dollar for dollar . . . write, wire or phone today.

MICHIGAN POWER SHOVEL COMPANY
400 Second Street, Benton Harbor, Michigan, U.S.A.

Track

W. H. Sproule, roadmaster on the London division of the Canadian Pacific, with headquarters at Guelph, Ont., has retired after 34 years of service.

N. C. Holmes has been appointed roadmaster on the Chicago & North Western, with headquarters at Ironwood, Mich., succeeding **G. Darrow,** who has retired.

Robert Wright, assistant roadmaster on the New York, Chicago & St. Louis, at Bellevue, Ohio, has been promoted to roadmaster on the Middle division of the Lake Erie and Western district, with headquarters at Topton, Ind., succeeding **George W. Preston,** who has retired after 29 years of service.

W. H. Brown has been appointed assistant supervisor of track on the New York Central, with headquarters at Elkhart, Ind., succeeding **C. L. Spitzer,** who has been promoted to supervisor of track, with headquarters at Bryan, Ohio. **L. D. Schuster,** supervisor of track, with headquarters at Bucyrus, Ohio, has been transferred to La Porte, Ind., replacing **B. R. Ceranowski,** who, in turn, has been transferred to Bucyrus.

David H. Yazelle, assistant supervisor of track on the Louisiana division of the Illinois Central, at Jackson, Miss., has been promoted to supervisor of track, with headquarters at Tutwiler, Miss., succeeding **T. A. Winborn,** who has been transferred to Decatur, Ill. Mr. Winborn succeeds **A. B. Hillman, Jr.,** who has been transferred to Cherokee, Iowa, to replace **H. L. Hood,** who has been transferred to Carbondale, Ill. Mr. Hood succeeds **B. A. Williamson,** who has been transferred to Princeton, Ky., to replace **W. R. Pruitt,** who has been transferred to Central City, Ky. Mr. Pruitt succeeds **M. L. Wheatley,** who has resigned.

J. B. Skidmore has been appointed roadmaster on the Chicago, Rock Island & Pacific, with headquarters at Peoria,

Ill., succeeding **A. Mills,** who has been transferred to Wichita, Kan., where he replaces **E. Rohloff,** who has been transferred to St. Joseph, Mo. Mr. Rohloff succeeds **H. L. Kelly,** who has been assigned to other duties. **L. E. Snyder,** who has been on a leave of absence, has returned to his position as roadmaster at Des Moines, Iowa. **F. E. Long,** who held that position during Mr. Snyder's absence, has been transferred to Clay Center, Kan., succeeding **R. D. Anderson,** who has been assigned to other duties. **R. E. Smith** has been appointed acting roadmaster, with headquarters at Eldon, Mo.

J. C. Neff, assistant engineer in the office of the engineer maintenance of way of the New York Central, with headquarters at New York, has been appointed supervisor of track, Subdivision 26, Pennsylvania division, at Jersey Shore, Pa., to succeed **W. R. Benish,** whose promotion to assistant division engineer of the St. Lawrence division, with headquarters at Watertown, N. Y., is noted elsewhere in these columns. **Thomas Burrell, Jr.,** assistant supervisor on Subdivision 29, Eastern division, at Brewster, N. Y., has been transferred to Subdivision 5, Mohawk division, with headquarters at Albany, N. Y., replacing **W. S. Ledyard,** whose appointment as assistant engineer at New York is also noted elsewhere in these columns. **J. J. Clarkin,** transitman on the Electric division, at New York, has been promoted to assistant supervisor at Brewster to succeed Mr. Burrell.

Robert F. Farish, section foreman on the Southern at Red Hill, Va., has been promoted to assistant track supervisor at Monroe, Va. **Luther J. Ivester,** gang foreman at Bessemer City, S. C., has been appointed assistant track supervisor at Charlotte, N. C. **James M. Peek,** assistant supervisor of track at Columbia, S. C., has been transferred to Greenville, S. C. **Jack E. Greene,** assistant foreman at Culpeper, Va., has been advanced to assistant track supervisor, with headquarters remaining at Culpeper. **Robert L. Beverly,** assistant foreman, extra gang, has been promoted to assistant track supervisor, with headquarters as before at Manassas, Va. **Dearing F. Tolley,** foreman at Garner, N. C., has been advanced to assistant track supervisor at Durham, N. C., and **John T. Marlowe** has been made assistand track supervisor, with headquarters at Attalla, Ala.

W. D. Strieff, junior engineer on the Pittsburgh division of the Pennsylvania, has been promoted to assistant supervisor of track on the Lake division, with headquarters at Cleveland, Ohio, succeeding **W. R. Carpenter,** who has resigned. **G. E. Hartsoe,** junior engineer on the Eastern region, has been promoted to assistant supervisor of track on the Philadelphia division with headquarters at Enola, Pa., succeeding **W. N. Worfel,** who has been transferred to the Middle

(Continued on page 1154)

Precision

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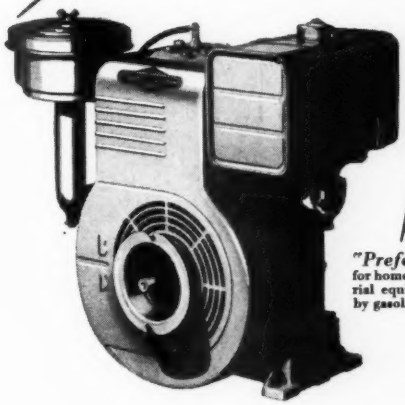

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Railway Personnel (Cont'd)

division, with headquarters at Altoona, Pa. Mr. Worfel succeeds **M. L. Stone,** who has been appointed acting branch line supervisor of track on the Pennsylvania Reading Sea Shore Lines, with headquarters at Tuckahoe, N. J., to replace **F. J. Nolan,** who has been granted a leave of absence because of illness.

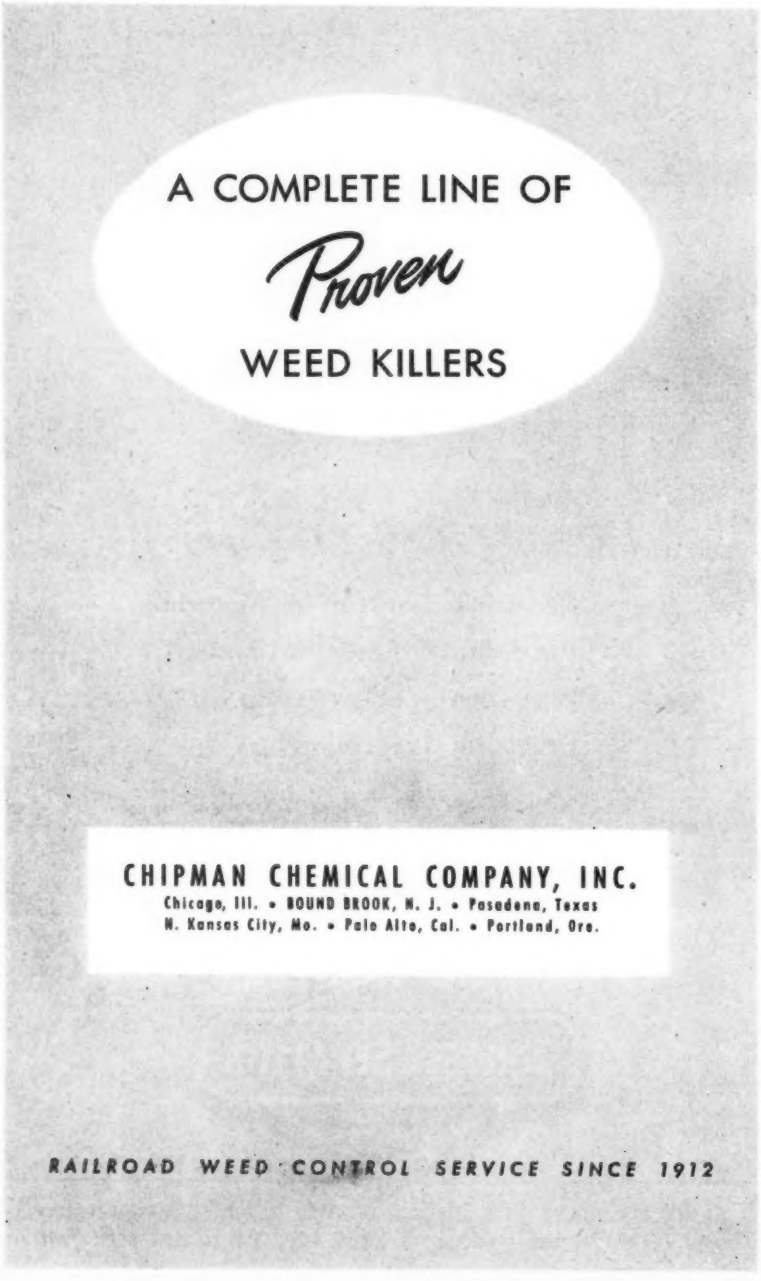
Bridge and Building

As a result of the abolition of the Toledo division of the Pennsylvania, as reported elsewhere in these columns, **J. D. Moore,** master carpenter of that division, has been appointed assistant master carpenter on the Columbus division, with headquarters at Columbus, Ohio.

Obituary

Kenneth B. Stinson, roadmaster on the Canadian Pacific, with headquarters at Aroostook Junction, N. B., died recently at the age of 48.

Joseph H. Wilbourne, retired division engineer on the Central of Georgia, died at Albany, Ga., on October 19, at the age of 80.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Association News

American Railway Engineering Association

At a meeting of the Board of Direction on November 10, the report of the Nominating committee, which met on the same day, was received. An announcement of nominations will be made as soon as acceptances have been received from the candidates. The returns of the letter ballots on the recent changes in the constitution of the association show that an overwhelming majority of the membership has approved the changes.

The pamphlet giving the personnel and assignments of the various committees will be mailed to all committee members about December 15. The December bulletin (491) will be mailed early in December. This bulletin contains the reports of the Committees on Buildings, Ties, Wood Preservation, Maintenance of Way Work Equipment, Economics of Railway Labor, Waterproofing and Impact.

Meetings and Conventions

American Railway Bridge and Building Association—Elise LaChance, Secretary, 431 S. Dearborn Street, Chicago 5.

American Railway Engineering Association—Annual Meeting, March 13-15, 1951, Chicago. Neal D. Howard, Secretary, 59 E. Van Buren street, Chicago 5.

American Wood-Preservers' Association—Annual meeting, April 24-26, 1951, Stevens Hotel, Chicago. H. L. Dawson, Secretary-treasurer, 839 Seventeenth Street, N. W., Washington 6, D. C.

Bridge and Building Supply Men's Association—L. R. Gurley, Secretary, 201 North Wells street, Chicago 6.

Maintenance of Way Club of Chicago—Next meeting December 18, 1950. E. C. Patterson, Secretary-treasurer Room 1512, 400 W. Madison street, Chicago 6.

Metropolitan Maintenance of Way Club—Secretary, 30 Church street, New York.

National Railway Appliance Association—Robert A. Carr, Secretary, 310 South Michigan avenue, Chicago 4; Lewis Thomas, Assistant Secretary, 59 East Van Buren street, Chicago 5.

Railway Tie Association—Roy M. Edmonds, Secretary-treasurer, 610 Shell Building, St. Louis 3, Mo.

Roadmasters' and Maintenance of Way Association of America—Elise LaChance, Secretary, 431 S. Dearborn street, Chicago 5.

Track Supply Association—Lewis Thomas, Secretary, 59 E. Van Buren street, Chicago, 5.

National Railway Appliances Association

Robert A. Carr, president, Dearborn Chemical Company, Chicago, has been elected secretary of the N. R. A. A. to succeed R. B. Fisher, who has resigned. Lewis Thomas, general sales manager, Q & C Co., Chicago, continues as assistant secretary.

Roadmasters' Association

The activities of the association for the coming year are to be outlined at a meeting of the Executive committee to be held at the Engineers' Club, Chicago, on December 11. In all probability the committee will spend most of the day appointing the committees—chairmen, vice-chairmen and personnel—to conduct investigations and prepare reports on the six subjects that were chosen for study during the year at the close of the convention in September.

Association Formed by Railway Track Contractors

Following several meetings held in Chicago during the past year, announcement has been made of the formation of the Associated Railway Track Contractors of America, to represent track contractors throughout the United States.

The new organization will hold its annual meetings in Chicago during the month of October, the announcement said. Temporary offices have been set up at 111 West Washington street, Chicago. Officers elected at the most recent meeting of the group include: Royce Kershaw, Montgomery, Ala., president and director; Murray Bailes, Jacksonville, Fla., vice-president; John Deckert, Chicago, secretary and director; M. F. Longwill, St. Louis, Mo., treasurer; and T. E. Scholes, Reading, Pa., Charles D. Kelly, St. Louis, and A. S. Wilkstrom, Skaneateles, N. Y., directors.

Maintenance of Way Club of Chicago

The November meeting of the club, the second of the season, was held on the twenty-seventh at the usual place—Eitel's restaurant in the Field Building at Chicago. A feature of the meeting was an address on the Effect of Modern Track Construction on Track Maintenance, by R. G. Simmons, general roadmaster, Chicago, Milwaukee, St. Paul & Pacific.

The next meeting of the club will be held on Monday, December 18. At this meeting Col. John W. Wheeler, executive assistant, Chicago, Burlington & Quincy, will discuss the more interesting features of the construction of the cutoff that the Burlington is building to speed traffic between Chicago and Kansas City. This project will involve the construction of nearly 50 miles of new line, and the reconstruction of about 22 miles of existing line.

Supply Trade News

General

The **Union Carbide & Carbon Corp.** has announced the formation of the **Oxweld Railroad Service Division,** which will conduct the business of the **Oxweld Railroad Service Company.** The latter company has been dissolved, and all of its assets have been transferred to its parent corporation.

The **Benbow Fence Tightener Company,** Benbow, Cal., has announced the appointment of the following sales representatives: R. B. Hill, Railway Exchange Building, Chicago; George G. Prest, First National Bank Building, St. Paul 1, Minn; the Achuff Railway Supply Company, 5627 Manchester avenue, St. Louis 10, Mo.; and M. F. Brady, 2316 Northwest Twenty-Second street, Portland, Ore.

Personal

M. B. Garber has been appointed director of sales for the **Thew Shovel Company,** Lorain, Ohio. **J. T. Cushing**

BALLAST IS SCREENED BY CONTRACT — ELIMINATING INVESTMENT BY RAILROADS IN THIS ONE-OPERATION EQUIPMENT . . .

Stone ballast cleaned by the Speno method is thoroughly cleaned because it is screened twice. In order to obtain a thorough cleaning, two passes are necessary to restore the ballast to as clean a condition as when it was originally placed in the track. The two passes are accomplished in less time than a single pass by other mechanical methods.

Preferably, the ballast is cleaned ahead of a general track raise, and under the Speno method, no cribbing is necessary. Because of the drainage that the Speno method attains, the cleaning lasts from one general raise until it is time for another general raise, normally over a period of from three to six years, depending on conditions.

Speno equipment, working under traffic without interference with railroad operation, (the track adjacent to the one being worked is not fouled by our equipment in working position) easily keeps ahead of track raising programs.

The high production and low cost of this service are worthy of consideration.

FRANK SPENO RAILROAD BALLAST CLEANING CO. INC.

306 North Cayuga Street Ithaca, New York

Supply Trade News (Cont'd)

has become sales manager in complete charge of all domestic sales except those to the federal government. **Q. J. Winsor** has relinquished his present duties as assistant general manager and assumed a new position under the general manager with the title of manager of development sales.

Dr. H. K. Ihrig has been elected vice-president in charge of research of the **Allis-Chalmers Manufacturing Company,** Milwaukee, Wis. Dr. Ihrig was formerly vice-president and director of laboratories of the **Globe Steel Tubes Company, Milwaukee.**

J. D. Grace, manager, advertising and sales development department of the **Nordberg Manufacturing Company,** Milwaukee, Wis., has taken over the advertising duties of **Delbert Kay,** who has retired after 27 years of service as Nordberg's advertising manager.

Austin C. Ross, manager of the Buffalo (N. Y.) works of the **Worthington Pump & Machinery Corp.,** has been elected vice-president of that company. Mr. Ross will continue to serve as Buffalo works manager.

The Gerrard Steel Strapping Company, Chicago, has announced the election of **William B. Renois** as sales vice-president, succeeding **S. G. Adolf Larsen,** who has been appointed assistant to president. The company has also announced the appointment of **Harry M. Reed** as Chicago division manager, a newly-created post, and of **Arthur W. Carlquist** as general sales staff manager.

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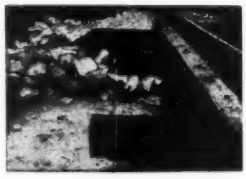

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W. A. McFarland has been appointed chief chemist of the American Lumber & Treating Co., Chicago, succeeding **V. F. Hribar,** who has been recalled to active duty with the U. S. Navy.

The **Carnegie-Illinois Steel Corporation** has announced the appointment of **Francis C. Hardie** as manager of its Indianapolis (Ind.) district sales office, succeeding **William E. Blackburn,** who has retired.

William E. McCoy, district representative for the **Caterpillar Tractor Company** in the Eastern division, has been appointed assistant sales manager of the Central division, succeeding **Herman Eberling,** who recently went on active duty as a captain in the U. S. Army Corps of Engineers.

Ray A. Burt has been appointed Pacific coast district sales manager of the Ramapo Ajax division of the **American Brake Shoe Company.** He joined the company in 1937 and has been sales representative in the Pacific coast district since 1944. Mr. Burt will continue to be located at Los Angeles, Cal.

Harmond S. Eberhard, vice-president of the **Caterpillar Tractor Company,** Peoria, Ill., has been promoted to executive vice-president. **William Blackie,** vice-president, has been selected to coordinate with Peoria the administration of the Joliet (Ill.) and San Leandro (Cal.) plants and the Caterpillar Tractor Company, Ltd. (new British subsidiary). **E. W. Jackson,** director of parts and service, and **Ralph M. Monk,** director of industrial relations, have been advanced to vice-presidents.

The **A. M. Byers Company,** Pittsburgh, Pa., has appointed **A. D. Sheere** as manager of the San Francisco, Cal., division, to succeed **P. D. Tabler,** who has retired. Mr. Sheere joined the Byers firm in 1924 and formerly was manager of the Houston, Tex., division. **N. L. Brown,** formerly field service engineer with the St. Louis, Mo., division, has been appointed to succeed Mr. Sheere in Houston. Mr. Brown joined the organization in 1940.

The **Osgood Company** and the **General Excavator Company,** Marion, Ohio, have combined their sales management and policies for distribution of Osgood and General power shovels, cranes, draglines, clamshells, hoes and mobilcranes. **L. O. McLean,** formerly sales manager of General Excavator, has been appointed director of sales development; **James S. Fortiner** has been appointed sales manager for the combined office and **Kenneth O. Williamson,** formerly division sales manager in New York-New England, has been appointed assistant sales manager. **George Day,** formerly sales manager of the Osgood Company, has retired after 30 years of service with the firm.

Allan L. Davis has been appointed manager of service of the transportation division of the **General Electric Company's** apparatus department in Sche-

(Continued on page 1158)

Because of expected shortages in both men and materials, 1951 will be a year of

- **GREATER MECHANIZATION and**
- **INTENSIFIED SUPERVISION**

Shortages necessitate more than ever that labor, materials and equipment be utilized to the greatest advantage to accomplish the maximum in results. Know what the approved practices are by having on hand the latest edition of the

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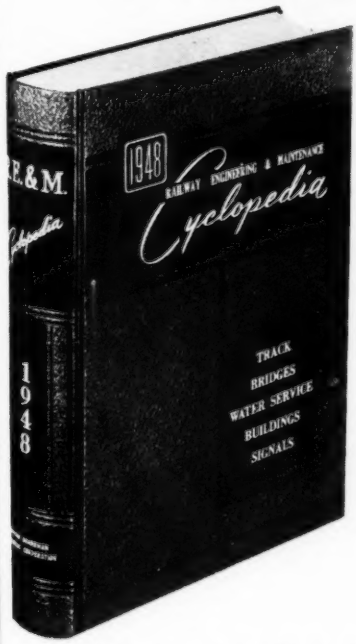

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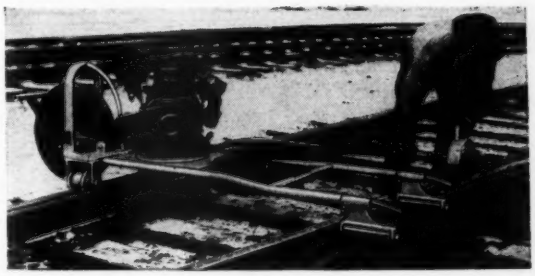

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Supply Trade News (Cont'd)

nectady, N. Y. The position is newly created and will be one of evaluating and analyzing service requirements for the transportation industry. Mr. Davis joined G. E. as service engineer in the Los Angeles, Cal., office in 1945. He later was appointed transportation engineer and, in May, 1947, was transferred to Schenectady as manager of the Alco-GE service engineering division, the position he held until his recent appointment.

John B. Keeler, manager of the traffic and transportation department of **Koppers Company, Inc.,** Pittsburgh, Pa., has been appointed vice-president of the company. A native of Bethlehem, Conn., Mr. Keeler is a law graduate of Georgetown University. He joined the staff of the Interstate Commerce Commission in 1910, and from 1920 to 1928 was attorney examiner and then confidential assistant to the chairman of the commission. He has been associated with Koppers since 1928.

Robert F. Golden has been appointed works manager for the **Eaton Manufacturing Company's** Reliance Division, and **C. A. Sellen** has been made assistant to the general manager. Mr. Golden received his B.S. and M.E. degrees from Georgia Institute of Technology. Previous to joining the Reliance Division of the Eaton Manufacturing Company, he served as assistant to the president of The National Lock Washer Company at Newark, N. J., where he held the positions successively of factory manager of National's Newark plant and steel mill at Riverside, N. J., and engineer in the Merchants Mill of the Pennsylvania Steel Company (now Bethlehem Steel Company).

Mr. Sellen graduated from Ohio State University in 1929 with a degree in metallurgy. Previous to his association with the Reliance Division, he served in the metallurgical laboratory for the Canton-Massillon district of the Republic Steel Corporation. He joined the Reliance Division in September, 1939, as chief metallurgist.

E. L. O'Rourke has been elected a vice-president of the **T. J. Moss Tie Company.** Mr. O'Rourke has been associated with the Moss organization since June, 1923.

John A. Ferguson has joined the sales staff of the **Simmons-Boardman Publishing Corporation, Chicago,** publisher of this magazine and other railway periodicals. Mr. Ferguson attended Northwestern University for two years and was graduated from the School of Commerce of DePaul University. He served for five years with the U. S. Army as ordnance officer of the Second Armored Division. He will have his headquarters in Chicago.

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Burro Cranes Have:

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We call Burro Cranes "Railroad Specialists" because they do so many railroad jobs so well. Track work, bridge work, bulk materials handling, Mechanical Stores Department, material handling with or without magnet, are only a few jobs Burro does with speed and economy. Burro Cranes are designed for railroad work—not adapted to it. Watch a Burro work and see why it's called on to do so many jobs by most of the country's railroads.

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Trade Publications

(To obtain copies of any of the publications mentioned in this column, use postcards, page 1099)

Coating for Metal Surfaces—The Flexrock Company has issued a folder on the use of a plastic material, called Longlife, for protecting metal surfaces. The folder tells where and how the product is used, discusses its effect on metals, and describes its protective qualities.

Asbestos-Bonded Pipe—Armco Drainage & Metal Products, Inc., has prepared a six-page folder entitled: Here's the Drainage Structure with a "One-Two" Punch, which gives data on the use of Armco asbestos-bonded pipe in situations where service conditions are severe. Installations of this pipe carrying highly-corrosive industrial sewage, and culverts exposed to salt water are described and illustrated.

Lorain Cranes—The new Lorain-50 Series of power shovels and cranes is presented in a new catalog recently published by the Thew Shovel Company. The machines in this series feature a hydraulic coupling as standard equipment. The bulletin describes and illustrates this feature and such others as new swing clutches, one-piece cast-steel turntable bed, air-controls for steering and a tread lock.

International Equipment—The International Harvester Company is offering three new folders on its line of power equipment. One of these (No. A-256-NN) embraces Diesel engines and power units. The second (No. A-257-NN) presents specifications and on-the-job illustrations of carbureted engines. The third (No. A-311-NN) describes many applications of the International line of engines and power units.

Johns-Manville "Roof Savers"—Johns-Manville has issued a four-page illustrated folder on three materials designed to prolong roof life, namely, Regal roof coating for roofs which have started to dry out, asbestos fibrous roof coatings for roofs which have dried out and eroded, and asbestos roof putty for roofs and roof structures which have broken. The folder also includes a discussion on why roofs wear out; an illustrated explanation of the ingredients used in the roof savers; and data on container sizes, weights and coverages.

Aluminum Structural Design—The Reynolds Metals Company has issued the 1950 edition of its handbook on the design of load-bearing aluminum structures. Containing 130 pages of text, illustrations and tables, all completely indexed, the book presents sufficient data to enable an engineer to design an original structure of aluminum, or to convert an existing structure from some other material to aluminum. The book will be sent without charge to designers, engineers, architects and other officials who request it on their company letterhead.

Mall Rail Grinder Operating Rail Drill Attachment

Maintenance Dollars Go Farther with a 8¼ H. P. Mall Off-the-Track Rail Grinder

One man and a Mall Rail Grinder can cover a lot of track and save a lot of time in keeping rail joints, frogs and switch points in smooth operating condition.

The variable speed 8¼ H.P. Gasoline Engine delivers abundant power for all grinding work as well as the interchangeable attachments for drilling rails, "I" beams, girders, ties and heavy timbers. The patented slip-lock detail on ends of heavy-duty flexible shafting makes tool changing quick and easy.

Over 30 years of portable power tool manufacturing experience is built into this rugged grinder that will stand up under hard, continuous use. Pneumatic wheel mounting for easy mobility.

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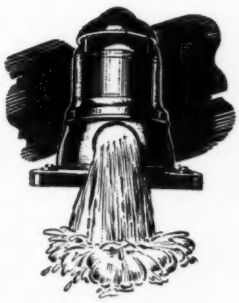

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For example, this I. C. TRAXCAVATOR handles thousands of cubic yards of cinders per year. Making a fill for a car-body site (see photo) the unit easily moves, spreads and finish-levels two 50-yard cars of cinders daily, carrying material 75 feet.

The TRAXCAVATOR expedites extending old spurs or building new ones. Its tractor-powered "crowd" handles hard clay digging, or heavy rock loading on ditch cleaning, slide removal, shoulder repair and similar work — all off-track.

After snows, this all-weather performer quickly opens the miles of walks and drives to give personnel ready access. Dependable, the unit has needed only one overhaul in 5 years of strenuous railroad duty.

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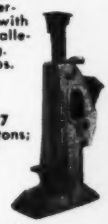

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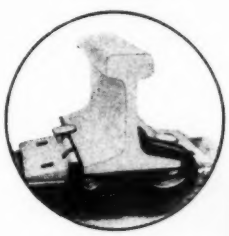

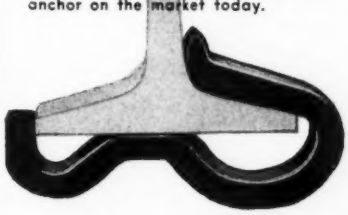

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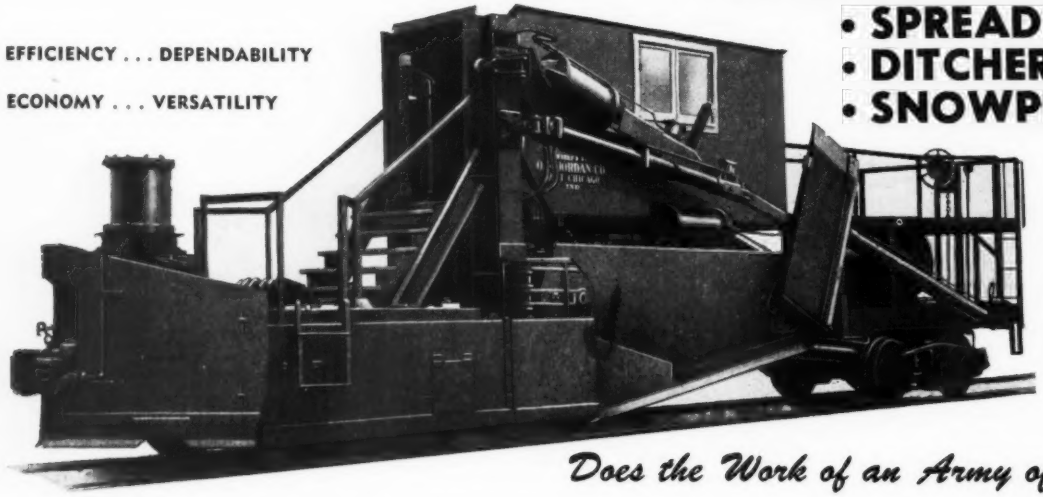

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